THIRTEENTH ANNUAL MEETING

# TRANSACTIONS OF THE

# Western Surgical and Gynecological Association

Thirteenth Annual Meeting, held at Denver, Colo., December 28 and 29, 1903 : : : : :

CHICAGO:
PRESS OF AMERICAN MEDICAL ASSOCIATION
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## OFFICERS FOR 1904.

PRESIDENT.

CHARLES H. MAYO, - - Rochester, Minn.

FIRST VICE-PRESIDENT.

H. D. NILES, - - Salt Lake City, Utah

SECOND VICE-PRESIDENT.

L. L. MCARTHUR, - - - Chicago, Ill.

SECRETARY-TREASURER.

B. B. DAVIS, - - - Omaha, Neb.

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## EXECUTIVE COUNCIL.

ALEX. HUGH FERGUSON, Chairman, - Chicago, Ill.

JAS. E. MOORE, - - - Minneapolis, Minn.

A. F. JONAS, - - - - Omaha, Neb.

CHARLES W. OVIATT, - - Oshkosh, Wis.

VAN BUREN KNOTT, - - Sioux City, Iowa.

19689

## EX-PRESIDENTS AND MEETING PLACES.

| PRESIDENT. | PLACE. | YEAR. |
|---|---|---|
| S. S. Todd | Topeka | 1891 |
| Milo B. Ward (deceased) | Kansas City | 1892 |
| Milo B. Ward (deceased) | Des Moines | 1893 |
| Lewis Schooler | Omaha | 1894 |
| J. E. Summers, Jr. | Kansas City | 1895 |
| T. J. Beattie | Topeka | 1896 |
| Jos. Eastman (deceased) | Denver | 1897 |
| D. S. Fairchild | Omaha | 1898 |
| H. C. Crowell | Des Moines | 1899 |
| O. Beverly Campbell | Minneapolis | 1900 |
| A. F. Jonas | Chicago | 1901 |
| Jas. E. Moore | St. Joseph, Mo. | 1902 |
| Alex. Hugh Ferguson | Denver | 1903 |

The Western Surgical and Gynecological Association does not hold itself responsible for, or necessarily endorse, any of the papers printed herein.

B. B. Davis,
*Secretary-Treasurer.*

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# EXECUTIVE SESSION

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## DECEMBER 28, 1903.—FIRST DAY—MORNING SESSION.

The Thirteenth Annual Meeting of the Association was held at the Brown Palace Hotel, Denver, Colo., December 28 and 29, 1903, under the Presidency of Dr. Alexander Hugh Ferguson of Chicago.

The Association was called to order at 10 a. m. by the President, after which the reading of papers was proceeded with.

Dr. W. W. Grant of Denver, Colo., read a paper entitled "Report of Two Cases: (1) Pancreatic Cyst; (2) Primary Carcinoma of the Lung."

This paper was discussed by Drs. Moore, Harris, and Basham, and the discussion closed by the essayist.

Dr. D. S. Fairchild of Des Moines, Iowa, read a paper on "Accidental Perforations of the Uterus," which was discussed by Drs. Macrae, Wallace, Wetherill, Bullard, and the discussion closed by the essayist.

In the absence of Drs. Jonas and Hollowbush, the President appointed Drs. D. S. Fairchild and J. E. Summers, Jr., to fill the vacancies in the Executive Council.

The next in order was a Symposium on Gastric Ulcer.

Dr. H. D. Niles of Salt Lake City, Utah, read a paper on "Treatment of Gastric Ulcer."

Dr. Frank C. Davis of Des Moines, Iowa, followed with a paper on "Gastric Ulcer; Its Etiology, Symptomatology and Diagnosis."

Dr. Archibald MacLaren of St. Paul, Minn., read a paper on "Perforating Gastric Ulcer."

These papers were discussed jointly by Drs. Oviatt, B. B. Davis, Freeman, Sifton, Mayo, and Harris, and the discussion closed by the essayists.

The Secretary presented the following list of new members, which had been acted on favorably by the Executive Council and recommended for membership:

Dr. J. B. Eagleson.....Seattle, Wash.
Dr. A. M. Pond.....Webster City, Iowa.
Dr. Lewis E. Lemen.....Denver, Colo.
Dr. Robert G. Sayle.....Milwaukee, Wis.
Dr. Archibald A. Kerr..Salt Lake City, Utah.
Dr. S. C. Baldwin.....Salt Lake City, Utah.
Dr. Charles A. Powers.....Denver, Colo.
Dr. J. W. Bullard.....Pawnee City, Neb.
Dr. Walter A. Jayne.....Denver, Colo.
Dr. Francis J. McNaught.....Denver, Colo.
Dr. C. K. Fleming.....Denver, Colo.
Dr. A. I. Bouffleur.....Chicago, Ill.
Dr. E. J. A. Rogers.....Denver, Colo.
Dr. Beverly McMonagle...San Francisco, Cal.
Dr. Geo. E. Goodfellow....San Francisco, Cal.
Dr. Thomas J. Maxwell.....Keokuk, Iowa.
Dr. Everett O. Jones.....Murray, Utah.
Dr. James F. Percy.....Galesburg, Ill.
Dr. Isaac B. Perkins.....Denver, Colo.
Dr. David P. Mayhew.Colorado Springs, Colo.
Dr. A. R. Mitchell.....Lincoln, Neb.
Dr. Thomas H. Hawkins.....Denver, Colo.
Dr. John Haggart.....Durango, Colo.
Dr. Chas. H. McLean.....Denver, Colo.

On motion of Dr. M. L. Harris, the Secretary was instructed to cast the ballot of the Association for the members whose names were read, which he did, and they were declared duly elected.

On motion, the Association adjourned until 1:30 p. m.

## First Day—Afternoon Session.

The Association reassembled, pursuant to adjournment, and was called to order by the President.

Dr. F. Gregory Connell of Leadville, Colo., read a paper on "The Treatment of Acute Hematemesis by Gastro-enterostomy, with Report of a Case."

Dr. Leonard Freeman of Denver, Colo., followed with a paper entitled "Two Cases of Acute Hematemesis in which Gastro-enterostomy Was Performed."

These papers were discussed jointly by Drs. Niles, Summers, Moore, Campbell, Ferguson, Mayo, and Fairchild, and the discussion closed by the essayists.

Dr. J. E. Summers of Omaha, Neb., read a paper on "The Treatment of Posterior Perforations of the Fixed Portions of the Duodenum," which was discussed by Drs. Bouffleur and Bowers, the discussion being closed by the essayist.

Dr. Charles W. Oviatt of Oshkosh, Wis., read a paper on "The Correction of Retrodisplacements of the Uterus."

Discussed by Drs. Wallace, Campbell, Ruth, MacLaren, Bowers, Macrae, Sutton, Potter, Ferguson, Niles, and Hertzler, and the discussion closed by the essayist.

Dr. B. B. Davis of Omaha, Neb., read a paper on "Intestinal Perforation in Typhoid Fever," which was discussed by Drs. Rogers, Knott, Moore, Bouffleur, Wallace, Sifton, Bowers, Wetherill, and Potter, and the discussion closed by the essayist.

Dr. Charles H. Mayo of Rochester, Minn., read a paper on "Observations on the Surgical Treatment of Goiter."

Discussed by Drs. Bullard, Bouffleur, Harris, Macrae, and Sutton, and the discussion closed by the essayist.

On motion of Dr. Moore, the business of the Association, which, according to the program, was to have been

transacted at the evening session, was postponed until 12 o'clock the following day.

The President stated that there would not be an evening session of the Association, as the program for the day had been finished.

On motion, the Association adjourned until Tuesday, 9:30 a. m.

The annual banquet of the Association was held in the evening at the Brown Palace Hotel, at which time President Ferguson delivered his address. He selected for his subject "The Surgical Treatment of Nephritis."

DECEMBER 29, 1903—SECOND DAY—MORNING SESSION.

The Association met at 9:30 a. m., and was called to order by the President.

The first in order was a Symposium on Prostatectomy.

Dr. George E. Goodfellow of San Francisco, Cal., read a paper entitled "Median Perineal Prostatectomy."

Dr. James E. Moore of Minneapolis, Minn., followed with a paper on "Complications and Sequelæ."

In the absence of Dr. John B. Murphy of Chicago, who was to have read a paper on the "Pathology, Indications for Operation and Operations by the Suprapubic and Perineal Routes," on motion of Dr. Mayo the President was asked to present this phase of the subject.

On motion of Dr. Ruth the paper of Dr. Murphy was read by title.

The symposium was then discussed by Drs. Powers, Lord, MacLaren, Jepson, Fairchild, and Macrae, and the discussion closed by Drs. Goodfellow and Moore.

Dr. M. L. Harris of Chicago read a paper on "The Use of Silver Foil to Prevent Adhesions in Brain Surgery."

Discussed by Drs. Lord and Maxwell, and, in closing, by the essayist.

The Secretary-Treasurer presented the following report:

## REPORT OF THE SECRETARY-TREASURER.

RECEIPTS.

| | | |
|---|---|---|
| Balance on hand Dec. 23, 1902 | $670.47 | |
| Fees and Dues as per cash book | 651.00 | |
| | | $1,321.47 |

DISBURSEMENTS.

| | |
|---|---|
| 1902— | |
| Dec. 29, George H. Simmons, Honorarium | $100.00 |
| Dec. 30, C. H. Wallace, Chr. Committee of Arrangements. | 75.00 |
| 1903— | |
| Jan. 6, O. T., fee refunded | 10.00 |
| Jan. 6, E. T. A., fee refunded | 10.00 |
| Jan. 6, ledger | .50 |
| Feb. 14, William Whitford, reporting 1902 meeting | 100.00 |
| Dec. 21, American Medical Association, printing Transactions, programs, express charges, etc | 285.90 |
| | $581.40 |
| Dec. 23, 1903, balance on hand | 740.07 |
| | $1,321.47 |

The Executive Council, to whom was referred the Secretary-Treasurer's report, subsequently made the following report:

It has audited the Secretary-Treasurer's books, and finds they are correct.

The Executive Council has considered the amendments to the Constitution and By-Laws, and recommends that the resolution introduced by Dr. Mayo be adopted. This resolution reads:

**RESOLVED, That hereafter no clinics or public operations be permitted during the sessions of this Association, and any member violating this rule shall stand suspended for the term of one year.**

On motion of Dr. Wright the recommendation of the Executive Council was concurred in.

The Executive Council recommended the adoption of the following resolution, subject to modifications:

**RESOLVED, That hereafter no person shall be eligible to membership in this Association who is not a member in good standing of the State Medical Association of the State in which he resides.**

On motion, this recommendation of the Executive Council was concurred in.

By the Executive Council:

**1. That applicants for membership must have been in active practice for at least five years, and at the time of their application must be devoting themselves to surgery or gynecology.**

On motion, this was adopted.

**2. That the limit of membership in this Association shall be 150; that applications for membership shall be in the hands of the Secretary two weeks before the date of the meeting, and the Secretary shall send the names of the applicants to each member of the Executive Council immediately after their receipt by him.**

It was moved that this resolution be adopted. Seconded and carried.

The Secretary read the following letter addressed to Dr. Moore, Chairman of the Executive Council:

Dec. 29, 1903.

*Dear Sir*:—I have the honor to extend through you an invitation to the Western Surgical and Gynecological Association to hold its next meeting in Milwaukee, Wis. I can offer the Society the most ample accommodations of the very best possible quality. The train service between Chicago and Milwaukee is a two-hourly service, both ways. Yours truly, H. A. SIFTON.

The Executive Committee recommended the acceptance of this invitation, and that the Association hold its next meeting in Milwaukee.

On motion of Dr. Harris, the invitation was accepted.

The Executive Council recommended that the following officers be elected to serve for the coming year:

*President*—Dr. Charles H. Mayo, Rochester, Minn.

*First Vice-President*—Dr. H. D. Niles, Salt Lake City, Utah.

*Second Vice-President*—Dr. L. L. McArthur, Chicago, Ill.

*Secretary-Treasurer*—Dr. B. B. Davis, Omaha, Neb.

*Councilors*—Dr. Charles W. Oviatt, Oshkosh, Wis., and Dr. Van Buren Knott, Sioux City, Iowa.

On motion of Dr. Harris, the Secretary was instructed to cast the unanimous ballot of the Association for the election of the officers named, which he did, and they were declared duly elected.

On motion of Dr. James E. Moore, a rising vote of thanks was extended to the retiring Secretary-Treasurer, whom he characterized as the "Father of the Association."

On motion, the Association adjourned until 1:30 p. m.

## Second Day—Afternoon Session.

The Association reassembled at 1:30 p. m., and was called to order by the President.

The Secretary stated that the Executive Council recommended that the date of the next meeting be December 28 and 29, 1904, and that Dr. H. A. Sifton be made Chairman of the Committee of Arrangements.

On motion, the report was adopted.

Dr. James E. Moore offered the following amendment to the By-Laws:

Under Section 7, headed Finance, change that paragraph under finance which reads: "Any member neglecting to pay his annual dues for two years shall forfeit his membership," to the following:

"Any member neglecting to pay his annual dues for two years shall be suspended, and after three years his name shall be dropped from the list of members. After suspension, he shall not be eligible for re-election until all back dues, together with the usual initiation fee, have been paid."

Dr. C. E. Ruth of Keokuk, Iowa, gave a demonstration and read a paper on "The Anatomic Treatment of Intracapsular Fractures of the Femoral Neck."

The paper was discussed by Drs. Maxwell, Lord, and, in closing, by the essayist.

Dr. J. P. Lord of Omaha, Neb., followed with a paper on "Multiple Loose Bodies in the Knee Joint," which

was discussed by Drs. Maxwell and Beede, and the discussion closed by the essayist.

Dr. Van Buren Knott of Sioux City, Iowa, read a paper on "The Surgical Treatment of Pulmonary Abscess."

Discussed by Drs. Potter, Maxwell, Thomas, Lord, Basham, Summers, Sutton, and Fairchild, and the discussion closed by the aúthor of the paper.

Dr. O. Beverly Campbell of St. Joseph, Mo., read a paper entitled "Surgery of the Arteries; Experimental Research."

Discussed by Drs. Hertzler, Moore, and Summers, and the discussion closed by the essayist.

Dr. H. G. Wetherill of Denver, Colo., read a paper on "Chronic Adhesions or Sclerosing Peritonitis."

Discussed by Drs. Lord and Freeman, and, in closing, by the essayist.

Dr. Donald Macrae, Jr., of Council Bluffs, Iowa, read a paper on "Portal Obstruction with Gastro-intestinal Hemorrhage Following Operation."

Discussed by Drs. Lord, Freeman, Fairchild, and Niles, and the discussion closed by the essayist.

Dr. T. E. Potter of St. Joseph, Mo., read a paper on "Cholecystitis, with Special Reference to Etiology and Diagnosis."

Dr. A. E. Hertzler of Kansas City, Mo., followed with a paper on "Anatomy and Physiology of Absorption, and Their Relation to Peritonitis."

Dr. William Jepson of Sioux City, Iowa, presented a contribution on "Primary Carcinoma of the Spleen, and Its Treatment by Splenectomy."

On motion, the following papers were read by title:

"Plastic Surgery of the Female Genital Organs," by Dr. Henry P. Newman of Chicago, Ill.

"Visceral Complications Resulting from Contusions of the Abdomen," by Dr. D. W. Basham of Wichita, Kan.

The President-elect, at this time, was introduced to the members of the Association, and was warmly received.

As there was no further business to come before the convention, on motion, the Association then adjourned, to meet in Milwaukee, Wis., 1904.

GEORGE H. SIMMONS, Secretary.

# PRESIDENT'S ADDRESS

## SURGICAL TREATMENT OF NEPHRITIS.

### (BRIGHT'S DISEASE.)

ALEXANDER HUGH FERGUSON, M.D.

**Professor of Clinical Surgery (P. and S.) Medical Department of Illinois University; Professor of Surgery, Chicago Post-Graduate; Surgeon-in-Chief, Chicago Hospital, etc.**

**CHICAGO.**

*Gentlemen:*—In looking down the list of names of the previous Presidents of this Association, I felt that year by year you had made no mistake in your selections. As a token of their regard for the unimpeachable title of honor bestowed upon them, each in turn in his annual address uttered no unstinted words of gratitude. In my own case, while it may be one of misplaced confidence, let me assure you, however, that I feel proud to be your President, and I now pledge you my sacred fealty, as well as extend to you my most sincere and grateful expressions.

If I have had any ambition in this Association, beyond that of doing my duty, it has been that I might some day leave my name on your roll of honor. Much sooner than I anticipated I have now the great pleasure of realizing this ambition, but at the same time the sense of responsibility oppresses me to such a degree that I crave your indulgent support, lest I should fail adequately to fill the position and to represent the Association.

The progress and good fortune of this great scientific body do not depend upon the prerogatives of the presiding officer of the hour, for it has been founded on a sound basis; its work is always substantial, and it possesses in its members an inherent vitality which will, with a charitable spirit, carry it over any stumbling-block created by its President.

It is not necessary in this, its thirteenth year, to reiterate or explain its objects, nor apologize for its existence as an independent organization.

It is equally uncalled for to vaunt its already acknowledged usefulness, and in that it truly represents the surgery and gynecology of the West. A pen picture of the past meetings, with their varied practical and often original productions, finds for me an opportunity hard to withstand from producing.

And it is with equal forbearance that I forego the temptation of speculating on the future of surgery. Rather than these, let my theme for this occasion be compatible with the unwritten laws that have governed all the functions of our Association in the past, and which has earned for us the silent motto, "Labor, labor, labor." In this line it was, after a good deal of deliberation and with considerable timidity, but with dutiful feelings, that I selected a subject which, though in its infancy, bids fair for universal and speedy adoption—"The Surgical Treatment of Bright's Disease."

As early as 1889 I explored the right kidney of a young man, 24 years of age, who presented symptoms of stone. There were pain and tenderness in the region of the kidney, and attacks of renal colic with hematuria at irregular intervals. No calculus was discovered by the exploration, but he was relieved of his colics and hemorrhages for some time. Four years later he died of Bright's disease.

For the next seven years my experience with the fixation of floating kidneys impressed me with two facts: First, that a symptomatic cure was obtained when the

organ was suspended by its rolled-off capsule, the nephralgia passing away and the urine becoming normal in quantity and quality; and second, that in cases diagnosed as nephralgia and floating kidney, when this was not done, but a simple nephropexy performed instead, many of the cases were not benefited by the operation. I recollect in 1890 operating on one of these a second time, on account of pain in the region of the kidney, where a stone was suspected. In my exploration the capsule was peeled off and the kidney opened and punctured. This effected a cure, and she is alive and well, Nov. 22, 1903 (by letter).

A more careful study of the cases of tender and floating kidneys revealed phenomena which gave us an increased interest from a clinical standpoint. The difference in the character of the pain, from sensations of a dragging weight or constant dull ache when on the feet, often eased when lying down, to severe paroxysms like renal colic; or, again, to exacerbations of pain of a neuralgic nature, sometimes extending to the nerves on the affected side, was suggestive of the existence of different conditions in the kidneys that had left their normal positions. The nausea, vomiting, anorexia, diarrhea, constipation, flatulence, debility, frequent urinary disturbances, emaciation and depression of spirits or mental confusion, often found in these cases, are no doubt expressions of mild uremia in nephritis, and not due, as we formerly supposed, to floating kidney *per se*.

It has been many times disputed that movable kidney produces any effect on the character of the urine. When a person with a floating kidney seeks advice, with often a history of scanty urine, high-colored, a sedimentary deposit, or at other times it is more copious than normal, and blood, hyaline and granular casts and albumin are found in it, there is a nephritis present as well, and whether the inflammation or the floating kidney existed first is often doubtful.

The graver condition now is the nephritis, and decapsulation and nephropexy are indicated. That a nephritis was present in the vast majority of my cases, I have verified by a microscopic examination of a portion of kidney tissue removed at the time of the operation. In three instances of floating and tender kidney met with since January, 1899, no changes were present in the kidney tissue. The pain and tenderness in them must have been caused by something else—congestion, nephralgia, twisting of the ureter, etc. This is positive proof that they are not all cases of nephritis, as I formerly supposed.

The only accurate means of diagnosing the condition of a kidney that is floating and tender, with no changes in the urine, is by a microscopic examination of a portion of the kidney. It is not infrequent to find interstitial nephritis (microscopically) when no albumin or casts are in the urine prior to the operation, which are instances of "nephritis without albuminuria." On the other hand, chronic Bright's disease may be present in floating kidneys, where pain was not a symptom nor tenderness a sign, but in what percentage I do not know. In my experience, I have refused to perform nephropexy, because Bright's disease was present as well as the floating kidney.

Do not these facts teach us that all floating kidneys should be suspended by their own stripped-off capsule, whether they are painful and tender or not, for by so doing we surely prevent the organ from again wandering; and, what is still more important, the progress of a destructive disease in a large percentage of cases may be cut short. I have yet to see a case in which decapsulation and suspension of a normal kidney did harm.

During 1897 and 1898 I frequently expressed the opinion at my clinics that a certain form of Bright's disease (interstitial nephritis) was always connected with a tender floating kidney, and was symptomatically

cured by stripping off the capsule and suspending the kidney; but we now know this is not always the case. While formerly my object in the treatment of these cases was to put the kidney at rest, now, however, on account of the frequency with which inflammation occurs at the same time, the treatment of the latter becomes the more important.

On June 17, 1896, at the Chicago Post-Graduate Hospital, I performed decapsulation for nephritis and floating kidney in a young girl, with excellent immediate results. I was assisted by Drs. W. A. Tichenor and E. M. Brown.[1] My first double decapsulation for nephritis and floating kidney was performed also at the Post-Graduate Hospital, on Dec. 9, 1897, assisted by Drs. E. M. Brown and W. A. Tichenor, and in the presence of a large class of doctors from different states.[2] The immediate result was amazingly good. It is now over six years since I operated on this woman. She is in better general health than she has been for the last eighteen years. I have had her urine examined four times the last month, with the same report each time, as follows: In twenty-four hours, 60 ounces. No albumin; no sugar; no casts; no blood; urea 1½ per cent.

This case is important for many reasons. Chief among them are:

1. That her right floating kidney was fastened a year previously by stitching it in place by a good gynecologist, without splitting or peeling off the capsule, but thereby she was not relieved.

2. Decapsulation relieved this same kidney of pain and tenderness.

3. The double decapsulation so far has cured her interstitial nephritis.

4. Six years last September 9 seems a fair time test.

On Dec. 16, 1898, in a discussion at the Chicago

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1. Journal of the American Medical Association, July 4, 1903.
2. Case 2, Jour. Am. Med. Assn., July 4, 1903.

Gynecological Society on "Movable Kidney," I advanced the following ideas:[3]

"Upon the kidney being exposed, its condition is to be considered. If there be a firm adherent capsule to the kidney, it had better be stripped off, as, for instance, in interstitial nephritis. The stripping off of such a capsule improves the condition of the kidney, in that it liberates its cortical portion, and we observed the improvement in the urine afterward.

"I do not wish to be misunderstood with reference to removing the normal capsule of a kidney. I condemn this, and I do not do it. But the peeling off of a thick, pathological capsule is a thing that is desirable. I have gone into the subject at considerable length in my surgical work, and the distinguished Professor Klebs agrees with me that where we have a thickened, fibrous, pathological capsule, pressing upon and destroying the kidney, it is a good sound surgical practice to peel off the capsule."

This was before I had removed portions of kidney for microscopic examination, but the opportunity to do this soon arose.

The Chicago Academy of Medicine held a symposium on Feb. 10, 1899, on "Nephritis," and the surgical aspects were assigned to me. I headed my paper "The Surgical Treatment of Nephritis (Bright's Disease)." I there made mention of my early work, and reported two cases of interstitial nephritis and floating kidneys, giving a microscopic report of sections.

The different papers were published in THE JOURNAL A. M. A., March 11 and 18, 1899, my paper appearing in the latter.

These two cases were operated on January 4 and 14, 1899, respectively, and are still, from a recent report, in good health.

In about a month later, Dr. G. M. Edebohls pub-

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3. The American Gynecological and Obstetrical Journal, Feb., 1899.

lished his first article, entitled "Chronic Nephritis Affecting a Movable Kidney, as an Indication for Nephropexy."[4] Since then his knife and pen have been busy on behalf of renal decapsulation for nephritis, giving us the most extensive experience of any one surgeon.

In my work I am pleased to report progress in all the cases reported at New Orleans last May. Between four and five years ago only two surgeons, Dr. Edebohls and myself, were decapsulating kidneys for Bright's disease. Since then no less than about forty surgeons have reported cases. Among them are:

Drs. W. T. Belfield, Chicago; E. J. Bingham, Walla Walla; W. T. Bull, New York; B. O. Coates, Cleveland; H. W. Cushing, Boston; J. W. Elliott, Boston; L. Freeman, Denver; R. H. Gibbons, Scranton; S. C. Gordon, Portland, Me.; Carl Hamann, Cleveland; F. Kammeren, New York; G. MacGowan, Los Angeles; F. E. Markoe, New York; J. C. Munro, Boston; A. J. Ochsner, Chicago; J. W. Perkins, Kansas City; A. C. Bernays, St. Louis; J. B. Blake, Boston; H. L. Burrell, Boston; G. W. Crile, Cleveland; I. N. Danforth, Chicago; C. H. Frazier, Philadelphia; F. H. Gerrish, Portland, Me.; G. E. Goodfellow, San Francisco; R. Guiteras, New York; A. F. Jonas, Omaha; R. A. McArthur, Chicago; A. S. McKenzie, Portland, Oreg.; R. Morris, New York; J. A. Nydigger, Baltimore; Roswell Park, Buffalo; A. Primrose, Toronto; A. E. Rockey, Portland, Oreg.; Paul Thorndike, Boston; T. P. Whaley, Charleston; W. N. Wishard, Indianapolis; J. E. Summers, Omaha; R. F. Weir, New York; H. J. Whitacre, Cincinnati; Albert Peacock, Chicago.

These have been collected by Dr. Ramon Guiteras of New York, except the last,[5] and number 120 cases in all.

I wish to add three important cases to this list.

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4. Medical News, New York, April 22, 1899.

5. New York Medical Journal and Philadelphia Medical Journal, Nov. 7 and 14, 1903.

CASE 1.—*Renal Decapsulation and Puncture for Acute Diffuse Nephritis. Death.*—On the 12th of June last, Dr. Ira H. Rea called me to see a case with him and Dr. W. H. Waugh, at Wheaton, Ill. The patient, a man 56 years of age, had been ill with acute nephritis for twenty days. He was a merchant, visited Wisconsin on business, and there caught cold while driving through the country. When Dr. Rea saw him on his return, his urine was scant, 30 ounces in twenty-four hours, and very bloody, but contained no casts. He then complained of pain in the region of both kidneys, and felt very ill. He was a man of excellent habits, and never before gave any evidence of nephritis. The doctor had been treating him for stomach disturbances off and on for several months. During this period he had an analysis made of the urine several times by Dr. W. A. Evans of the Columbus Medical Laboratory, and at no time did it contain the slightest evidence of kidney disturbance or disease. A few months previously he passed for life insurance. Dr. Rea also had made examinations of his urine repeatedly, with negative results.

When I saw him, on the twentieth day of his illness, he was *in extremis*. A general puffiness of the face and extremities, a rapid respiration (thirty-six per minute), and an uncontrollable drowsiness, with persistent vomiting, presented an unmistakable picture of his condition. He had only passed 8 ounces of urine in six days, which contained blood; urea, 1 per cent. per vol., but no casts. He had been kept profusely perspiring for days, and this accounted in part for the scant urine. It appeared that he responded to treatment very well the first few days, and even got out of bed. A relapse of his symptoms stubbornly resisted all medication and attention.

Decapsulation of his kidneys was discussed. It was clear that he was about to pass away before long, and

everything else had been already done. With the distinct understanding that possibly an operation might relieve him, I undertook the procedure on the right kidney there and then, assisted by Drs. Rea, Waugh and Norman H. Ferguson. Local anesthesia (cocain) was used until the kidney was exposed. The traction on the forceps grasping the fat gave him pain, so a little chloroform was administered to the point of analgesia, and the kidney decapsulated, punctured, and a V-shaped piece removed. The bleeding from where the section was removed was so profuse that a couple of mattress sutures of catgut had to be passed to control it. The kidney was about normal in size, nodular on its surface, and of a dark blue color. It felt tense, and its capsule was blistered and separated here and there from the cortex by bloody serum. Upon splitting it, bloody serum escaped, and no difficulty was experienced in peeling out the kidney with my finger. The capsule easily tore, and it was nearly all removed. With the capsule removed, the kidney was dark red in color, and firm and friable in consistency. In my judgment, here was a condition in which many punctures were indicated. My objects in puncturing a diseased kidney in many places are: (1) To relieve tension; and (2) to open many glomeruli, urinary tubes and blood capillaries. From these openings blood, serum and urine come from the kidney at once into the dressings. To come back to this case, I drained the wound with a rubber tube and plain gauze. He died in fifteen hours after the operation from edema of the lungs, for his lungs filled up, and he never regained consciousness. In my opinion, he died sooner than he probably would have if left alone. No urine entered the bladder after the operation, but the dressings had to be changed several times, and they were soaked with a bloody fluid, having the odor of urine.

*Pathologic Report.*—A study of many sections of the

portion of kidney tissue showed an acute diffuse inflammation engrafted on a chronic interstitial nephritis. The Malpighian bodies suffered severely, their epithelium being degenerated and necrotic here and there. The streaks of red running through the specimen were linear hemorrhages. The small, mottled, grayish-red spots were the epithelial cells of the convoluted tubes and Malpighian bodies greatly proliferated, degenerated and necrosed. The capillaries of the tufts were filled with cells and thrombi, with leucocytes and red blood corpuscles within Bowman's capsule. There was cloudy swelling; fatty and hyaline degeneration of the tubular epithelium. Along with these parenchymatous changes, the interstitial ones were fully as marked. Small-celled infiltration occurred about the capsules and between the tubes, and active proliferation of the connective tissue. Chronic changes were manifested by an increase of the connective tissue surrounding the Malpighian bodies and convoluted tubes, as well as hyperplasia of the walls of the blood vessels and thickening of Bowman's capsule. Bloody, hyaline and granular casts were pent up in several places within the tubules.

### IMPORTANT FEATURES OF THIS CASE.

1. Chronic interstitial nephritis, with every evidence of granular kidney without any previous symptoms or signs. If a microscopic examination of a portion of the kidney had not been made, the case would have gone down in history as one of acute nephritis.

2. The severity of the acute diffuse nephritis without other apparent cause than exposure to cold is remarkable. It was so severe that it might be called "hemorrhagic nephritis," which, however, is more characteristic of intense septic and infectious cases.

3. Operation was of no avail, because it was too late in being performed. This case supported the view that acute nephritis is considerably within the scope of the

surgeon's work. We are convinced that if double decapsulation and puncture had been performed within a week of his illness, he would at least be alive to-day. I am of the opinion that in acute inflammations of the kidneys the consultant should be the surgeon. In this man the surgical treatment of his kidneys should have been the same as of a phlegmonous inflammation of his hand, in which free incisions would have been promptly made to relieve tension, and to liberate imprisoned poisonous materials. It is through a study of surgical pathology, especially where the elements of the disease are caught red-handed, on the operating table, that true conservative surgery can be unassailably established.

CASE 2.—*Interstitial Nephritis, Chronic, Double Decapsulation. Recovery.*—(Surgical clinic at the College of Physicians and Surgeons, medical department, Illinois University, Nov. 20, 1903.) I operated on this man, who has just walked in to report himself, four weeks ago for chronic interstitial nephritis, and, as you will remember, his two kidneys were decapsulated at the one sitting. The surgical treatment of nephritis is not mentioned in your text-books. I am, therefore, constrained to give a brief review of this case, and also of the one I operated on a week ago. He is 45 years of age, strongly built, of better habits than formerly, and a Chicago politician by occupation. He was employed as a street-car conductor sixteen years ago, but had to give it up on account of pain in his back.

*Condition on Admission* (Nov. 16, 1903).—The face, hands and feet were swollen and edematous. Under the lower eyelid pitting on pressure was not as marked as on his feet and ankles, and still less on his hands. The conjunctivæ were chronically congested (red), and his eyesight was so poor that he could not recognize his friends very well. He had the appearance of one

who had been drinking heavily for a long time, although he had not imbibed. The fundus of both eyes revealed great capillary congestion, but no hemorrhages. His arteries were apparently sclerotic, and the left ventricle of the heart hypertrophied. There were no valvular lesions, but the second sound (aortic) was unduly accentuated. His most prominent complaints were:

1. Headache. This symptom began eight months ago, lasting at first from a few hours to two or three days; migraine in character. With the lapse of time the headache became more and more severe and persistent, until finally it was constant.

2. Dizziness. For several years dizzy spells would come over him occasionally, but since the onset of the severe headache this symptom became more frequent and troublesome.

3. Vomiting, nausea, retching and sometimes diarrhea were gastro-intestinal disturbances which accompanied the severest attacks of headache.

4. Frequent urination. During the daytime he urinated about every hour; could not often go two hours with comfort, and at night he urinated four or five times. Lately he has had tenesmus at the neck of the bladder after micturition (septic deep urethra).

5. Loss of strength. His strength began to fail three years ago, and since then he has lost about twenty pounds. Since the headache has become so marked, he has not been able to earn a living with his head or hands.

6. Nervousness. Feeling miserable, sometimes drowsy and again wakeful. Between the attacks of headache, he felt a soreness through his brain, which prevented him from inclinations to thinking or talking. There has been some pain and tenderness in the region of his kidneys for several years, but lately this symptom was overshadowed by those already mentioned.

7. Coma once. One week before he entered the hos-

pital he became unconscious and remained in that condition for three or four hours. The coma followed one of his severe headaches. No convulsions occurred. He was in the hospital one week before I operated, which made it sixteen days after the occurrence of the coma. While the symptoms of this disease are varied and often insidious, making a diagnosis sometimes difficult, the few symptoms and signs I have already mentioned, even without telling about his urine, point to but one condition—interstitial nephritis.

*Urine Before Operation.*—Quantity, 72 ounces in twenty-four hours. Pale amber color; sp. gr., 1007; urea, ¾ of 1 per cent; albumin, 36 per cent.; pus cells; epithelium; casts, both hyaline and granular.

*Operation* (Nov. 23, 1903).—Chloroform was administered. A skin incision was made parallel to and half an inch below the twelfth rib on each side. The kidneys were then reached by splitting the muscles and dragging out the fat with forceps, which brought the kidney into view. The capsule was split over the cortex and peeled off. The right kidney was smaller and firmer than normal; the perinephritic fat was more vascular and fibrous than normal and firmly adhered to the kidney, and the capsule was thickened and firmly adherent to the cortex of the kidney. In stripping it off, small portions of kidney broke off with it in several places. While no effort was made to save the capsule from injury, still the major portion of it was left as a collar around the root of the kidney. The surface of the kidney was darkish-red in color, which bled rather freely, and also from multiple punctures. A V-shaped section was removed for microscopic study; from this wound arterial blood spurted from a small arteriole. A mattress suture of fine catgut controlled it. The fat was now displaced below the organ, the wound closed, and drainage of gauze and tube inserted to the surface of the kidney.

The left kidney was not so pathologic in appearance,

its surrounding fat and capsule not so thick and fibrous. Upon peeling off the capsule no bleeding occurred similar to that on the other side. A section of kidney tissue was removed.

*Urine After the Operation.*—For three days blood was present in the urine. The quantity passed in twenty-four hours varied from fifty-six to sixty-six ounces. The urine of the fourth day had a specific gravity of 1010; 20 per cent. albumin; urea, 1 per cent., and it also contained hyaline and granular casts; pus, which was from the deep urethra. Several examinations of it since then have shown no material change, and I expect to find albumin and casts for several weeks. In some cases the improvement in the urine is most remarkable, the albumin and casts disappearing between three and six weeks.

*Microscopic Report of Renal Tissue Marked R. and L.* (from the P. and S. Laboratory).—One (R.) was from the right kidney and the other (L.) from the left. The changes in both were characteristic of chronic interstitial inflammation. There was increase of fibrous tissue throughout the sections, forming concentric layers about the tubules and Bowman's capsule, with some round-cell infiltration. In the section from the right kidney there was complete atrophy of some of the glomeruli, represented by densely encapsulated hyaline masses. In no instance were the tufts and capsule normal, there being thickening and increase in the number of cells. The convoluted tubes showed hyaline, granular and fatty changes. Epithelial débris and tube-casts. Where the connective tissue was most abundant, the tubules were atrophied, and represented by cubical cells. A few of them were dilated.

*Result.*—The immediate result in this case is simply marvelous. The clinical picture is completely changed. Before the operation he was suffering with uremia, which was manifested by the headache, dizziness, vom-

iting and nervous disturbances; even a coma on one occasion. All his symptoms vanished within a week. His mind cleared up; sight completely restored and appetite returned. No headache, restless nights, vomiting nor pain in the back now. The appearance of the man has changed completely. The swelling and edema of his face, hands and lower extremities have disappeared. He looks happy, and says that he never felt better in his life.

CASE 3.—(Same clinic.) *Chronic Parenchymatous Nephritis. Double Decapsulation. Death.*—The case I operated on a week ago died on the third day from pulmonary edema. You will recollect that I gave a bad prognosis just as soon as I saw his kidneys. He was a young man, 18 years of age; had scarlet fever twelve years ago, but his nephritis was not discovered until nine months ago.

*Condition on Admission* (Nov. 13, 1903).—There was general edema all over the body. Face puffy, cellular tissue around the eyes filled with serum; scrotum slightly edematous; vision very bad, could not count fingers nor distinguish his mother from the nurse. He complained of "spots before his eyes" (fundus not examined), headache, indigestion, nausea, vomiting, frequent urination and a small quantity each time, backache and tenderness over the kidneys. Slight difficulty in breathing and occasional spasms of his muscles of the right arm. He was evidently verging on uremic convulsions.

*Urine Before Operation.*—In twenty-four hours twenty to thirty-six ounces. Quantity decreasing. Specific gravity, 1010. Pale, bad odor, acid; albumin, 35 per cent.; urea, 1 per cent.; hyaline and granular casts.

*Operation* (Nov. 13, 1903).—Chloroform throughout. Double decapsulation at one sitting, double nephrotomy and drainage. The first stroke of the knife through the skin and fat was followed by rapid oozing of clear serum.

During the entire operation it kept one assistant busy mopping it up. The fat around the kidneys was water-logged, the capsules thin and insignificant, the organs themselves very small, pale and bloodless. Each kidney was about one-third the size of a normal one. Upon passing the knife into the pelvis of each no bleeding whatever occurred, which was a bad sign. In this case I forgot to remove a section of kidney tissue until it was too late. It was so clearly a case of "small white kidney," parenchymatous nephritis in its clinical history, symptoms, signs and microscopic findings in the urine, that I feel satisfied with our diagnosis. He stood the operation well.

*Urine After Operation.*—First twenty-four hours eighteen ounces voided by bladder and dressings were soaked several times. Second twenty-four hours twelve ounces voided by bladder and dressings soaked three or four times. Bowels began to move rapidly and urine was not collected on third day, but the kidneys were secreting all the time.

*Result.*—Death at the end of three days from edema of the lungs. This young man had received from internists all the skill and medication that this city can afford. It was of no avail. Inasmuch as the exact condition of the kidneys could not be accurately known by the findings in the urine or symptoms and signs, I decided to offer him the only chance left for a respite from his nephritis. Considering that his kidneys were so extremely small ("small white") and in an advanced pathologic state, it is a surprise that the chloroform and operation did not put them completely out of commission. His kidneys secreted urine to the last.

## INDICATIONS FOR SURGICAL TREATMENT.

1. *Floating Kidney.*—Floating kidney may now be put down as one of the indications for decapsulation. An observation, no doubt a common one, is that a floating kidney is often accidentally discovered in one's own per-

son, or is found by a physician, at a time when no disturbing symptoms are present from it. It is made light of and often forgotten until some day it gets painful and tender, the urine becomes irregular in flow, sometimes scant and again profuse albumin appears in it; urea decreases; cylindroids are observed and the general health is being undermined. In a nervous person the pain might be suggestive in origin, but the urinary changes never. During the last six years I have held the view that a floating kidney should not be operated upon



**Figure 1.**

simply because it was dislocated. I therefore refused to operate on other than those giving disturbance. I have learned that several of those whom I advised to have no surgical interference came under the knife of some other surgeon. I made inquiries of thirteen widely-scattered cases, and all but three had undergone an operation because of the painful and annoying symptoms instituted by the floating kidneys.

On the other hand, a freely movable kidney may be diseased without causing pain and tenderness, or even

constant urinary changes. This experience and knowledge have convinced me that all cases of floating kidneys should be treated by decapsulation and fixation. I firmly maintain also that the surgeon's work is not complete without a microscopic examination of a piece from the kidney. It is surprising how often you find the unexpected—chronic nephritis.

2. *Nephritis and Floating Kidney.*—It has been maintained that cases of floating kidney with the symptoms and signs so characteristic of nephritis are not cases of



Figure 2.

nephritis at all, but that the condition is temporary, the symptoms disappearing in due time after nephropexy. The only way to refute such a statement is to exhibit under the microscope sections of the kidney of the cases in question. The immediate result in this class of cases has been so amazingly prompt, and the remote results so permanent, that some surgeons doubt these to have been cases of nephritis.

It is a matter of common clinical experience to find that nephritis does not always find expression in the

urine, and the data from it are often unreliable in forming an idea of the severity of the disease. Inasmuch as I could not produce better cases than the first two cases from which kidney tissue was removed to impress the importance of the microscopic examination, I am constrained to reproduce the reports, which are as follows:

*Pathologic Examination.*—(Klebs' Pathological Laboratory.) "The section of kidney from the case of Mrs. M., sent to the laboratory Jan. 4, 1899, presents the following changes: The connective tissue growth is not ex-

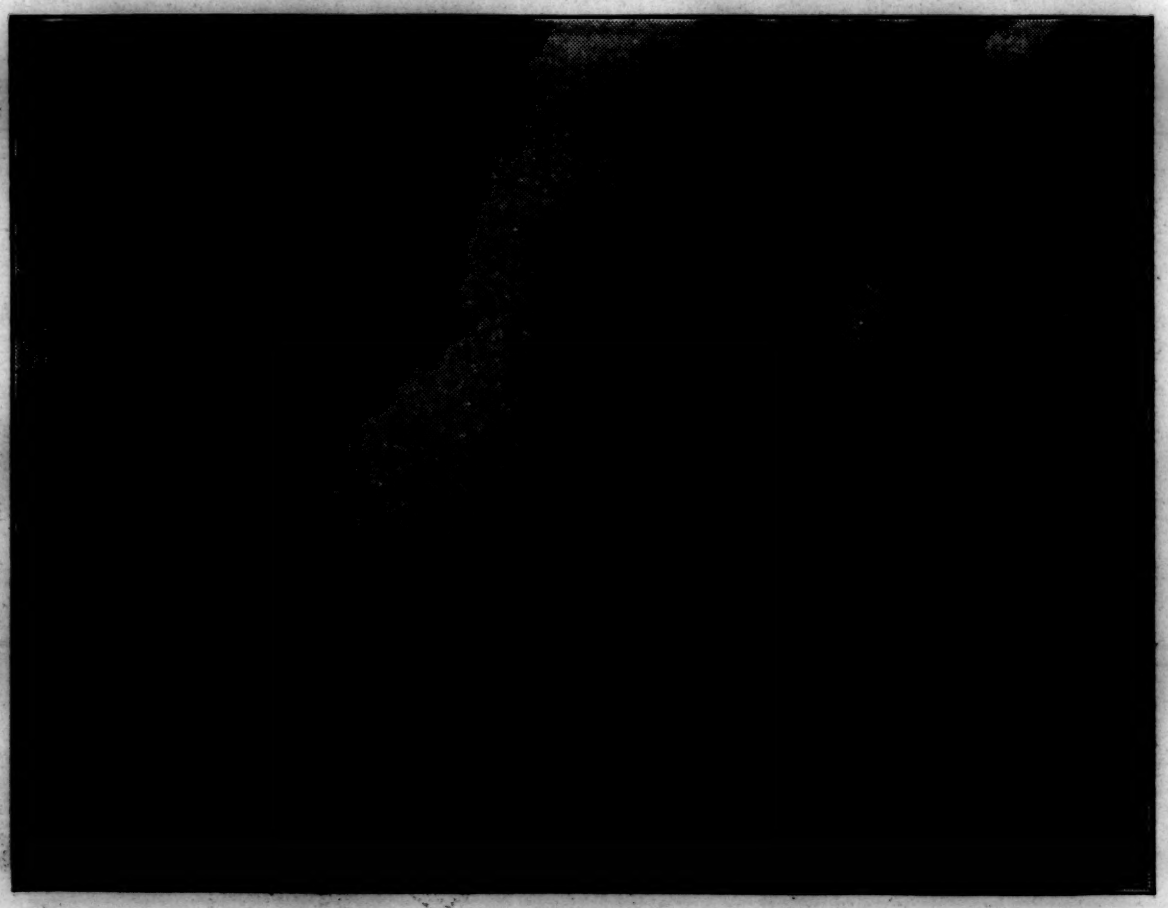


**Figure 3.**

tensive, the lining epithelium of the tubes is more implicated, as in chronic parenchymatous nephritis. The lining epithelium of the convoluted tubules shows cloudy swelling, and there is some small cell infiltration in some parts of the kidney, indicating that the inflammatory process is still existing. The epithelia of the glomeruli are nearly lost, some of the glomeruli consisting only of a homogeneous mass. Capsules of Bowman thickened; tubules with atrophic epithelium present, dilated tubules, desquamated epithelium in some of them,

hyperplastic connective tissue around others. Pathologic diagnosis: Interstitial nephritis with cloudy swelling."

The above pathology is represented by microphotographs Nos. 1, 2, 3 (Zeit). The second case from which kidney tissue was removed and studied Zeit furnished the following report:

"The section of kidney from the case of Mrs. W., examined Jan. 14, 1899, shows the picture of an interstitial nephritis with much proliferation and hyperplasia of connective tissue, areas of which consist entirely of



**Figure 4.**

this connective tissue growth, with obliterated or waxy glomeruli. Between these portions are found islands of partially changed kidney tissue, in which there are atrophic tubules and tubules with a desquamated epithelium, flattened epithelial lining in tubules of diminished caliber, and some cloudy swelling in the lining of the epithelial cells. In some of the tubules hyaline casts are found. The capsules of glomeruli are thickened, and their connective tissue with many nuclei is arranged in concentric layers."

These changes are represented by microphotographs Nos. 4, 5 and 6 (Zeit). These microphotographs speak for themselves and are produced for the first time, to put at rest whatever misgivings may have been expressed regarding the pathologic findings in those cases.

In reply to the statement that the cures were so rapid that they could not have been true cases of nephritis, it is, I must say, almost incredible that the clinical picture of one in suffering and distress can, within a few days, by a simple operation, be transformed



Figure 5.

to represent ease and happiness, but it is just as true as it is that most of the tender floating kidneys are true cases of nephritis, as demonstrated microscopically. It is equally hard to believe that within a few weeks or months the symptoms and signs of the nephritis clear up. We must remember that the kidneys have an abundant vascular supply, excretory tubes and glomeruli, more than enough to carry on their ordinary functions, and a recuperative and regenerative power that is most wonderful. With the knowledge that we possess of the rapid

subsidence of acute, subacute and chronic inflammations of other organs, and parts of the body, when properly treated, we should no longer doubt the rapid cure of kidney inflammation when given the best opportunity to flush itself of poisonous materials through its natural system of drainage, and also allow blood serum and urine to drain through punctures made in it. Nature repairs the traumatism made in reaching the kidney wonderfully rapidly, and why not as speedily restore the kidney to assume its function and cease supplying albumin, casts,



Figure 6.

etc., to the urine? In tender and floating kidneys the fact that a small portion of the organ is removed, and that we find it diseased, is no proof that the whole kidney is in the same pathologic condition. In sections from floating kidneys there are sometimes only slight changes, while again all the characteristic destructive changes of advanced nephritis are present. It is my firm belief that a floating kidney is a frequent cause of chronic nephritis, by constantly interfering with its vascular supply, nutrition and free excretion of urine.

3. *Nephritis.*—*a.* Acute Bright's disease. *b.* Chronic interstitial (Bright). *c.* Chronic parenchymatous (Bright).

Mr. Reginald Harrison boldly and successfully attacked acute diffuse nephritis under a mistaken diagnosis, but nevertheless originated the splitting of the capsule to relieve kidney tension, and has written fully concerning his cases. Whether acute Bright's disease be due to exposure to cold and wet, accompanies or follows specific fevers, or is caused by toxic agents or pregnancy, it would seem rational not to allow the patient to speedily die without following the example of Harrison.

## GENERAL REMARKS.

In looking over the literature I find that the causes of death after the operation in 123 cases, by different surgeons, were as follows: Four died of pulmonary edema, 6 of uremia, 4 of coma, 3 of sudden heart failure, 3 of exhaustion, and one each of endocarditis, suppression of urine (ether being given), anuria, general dropsy, collapse, pleuritic effusion and myocardial thrombosis. There were 27 deaths out of 123 cases, within a year after the operation. A closer analysis shows that of these 27 deaths, 6 died within eighteen hours after the operation, 9 between one and nineteen days, 2 between two and seven weeks, 3 between two and three months, and 1 lived a year. The vast majority of these deaths must not be attributed to the operation. Even allowing all deaths within a week to be due to the operation, there would be a mortality of only about 9 per cent. When the limitations of the operation are more clearly defined, and many of the extreme cases left alone, the mortality should not be more than 5 per cent. in the hands of experienced surgeons. It is fair to conclude that the earlier an operation is performed in these cases the less will be the fatality, and the greater the benefits.

# CARCINOMA OF THE LUNG; PANCREATIC CYST.

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I report two cases of carcinoma of lung because of special interest attached to each—one recurring after an unusually long interval, and having at one time coincident tubercle bacilli, and while occurring several years ago is worthy of record; the other recently, and seemingly primary.

J. M. D., aged 48, Davenport, Iowa, school teacher. Personal and family history good. In February, 1894, had a dry cough. By fall the cough had increased and weight diminished. At this time Bierring, the pathologist at the Iowa University, found tubercle bacilli in the sputa. He went to Santa Fé, New Mexico; returned in the spring of 1895, having gained fifteen pounds, with the disappearance of bacilli. In June, 1895, he was examined by me in consultation with his brother, Dr. De Armand of Davenport. He had resumed his work, was pale, suffering much from dyspnea on slightest exertion, cough dry and expectoration slight. Slight circumscribed dullness was manifested about bifurcation of right bronchus, with some roughness in respiration. With this condition and history I thought, with all others who had examined him, that he was suffering from tuberculosis. In the fall of 1895 he went to Phoenix, Ariz., and lost weight and strength rapidly. Glandular enlargement of neck, axillæ and head, I was now informed by letter, was conspicuous, which caused me

to suggest to his brother that the disease was malignant. He then informed me that six years before the left nipple was excised on account of a persistent ulcer, which was caused, it was believed, by a suspender buckle. This cleared up the history of the case, for it was undoubtedly a carcinomatous ulceration, though the interval of secondary infection was unusual.

He died June 2, 1896, after several months of extreme suffering from asphyxia. Postmortem by Dr. W. L. Allen of Davenport: effusion in both pleural cavities. Left lung in condition of atelectasis; right lung partially so. No evidence of tuberculosis. First bifurcation of left bronchus was surrounded by a fibrous mass, constricting the tube and completely excluding air. Same condition at same point of right lung, but permitting a little air to enter the lung. Pathological examination by Bierring showed the disease to be undoubtedly carcinoma. The coincidence of tuberculosis with carcinoma of lung or bronchial tubes has been repeatedly observed, but its existence and disappearance, as in the foregoing case, and the interval of at least four years from the excision of the nipple (no glands being removed) to the appearance of glandular infection and cough, make a history of unusual interest.

Shaw[1] reports a case of primary carcinoma of lung, and notes the similarity of tuberculosis in certain phases of the history. More recent cases are reported.

Mirklen and Girard[2] report a case constricting right bronchus, close to bifurcation. In thirty-one autopsies of carcinoma of lungs by Wolf, thirteen were complicated by tuberculosis. A great majority of cases of lung cancer are in men.

The second case is A. V. Rider, Davenport, Iowa, aged 57, railway engineer. He was in a collision in January, 1902, and suffered, he says, a fractured rib (left side), and from this he dates the beginning of his illness. May

1. British Med. Jour., June, 1901.
2. Presse Médicale, June, 1902.

14 he was seen by Dr. De Armand, who observed congestion of larynx and hoarseness, but did not regard his condition as serious. He continued to grow worse and Dr. De Armand examined him more thoroughly, and believed the case malignant. On June 4 he was seen by Dr. Allen. Paralysis of vocal cords and suffering from severe asthmatic symptoms, temperature normal and pulse 80. On June 22 I was passing through Davenport and was asked by Drs. De Armand and Allen to examine the man. He was suffering extremely from dyspnea, with loud crepitant and sonorous râles, and mucopurulent expectoration abundant. No bacilli; had lost thirty or forty pounds in the last three months. Dr. De Armand called my attention to a hard growth deep in the neck on left side of trachea, with fixed point in chest. No glandular enlargement and no pain. I had no doubt he was suffering from carcinoma of lungs or bronchi.

He died asphyxiated on June 25. Postmortem by Dr. Allen, who writes me that he removed a large, hard, irregularly shaped mass involving the bifurcation of bronchi, partially enveloping esophagus and aorta, with apparently some connection with connective tissue of anterior mediastinum. The lungs in the vicinity were involved and small nodules scattered through both lungs. There was also a prolongation of the growth into the neck on the left side. This was the mass felt on deep palpation of the neck on June 22.

Postmortem showed no disease whatever of stomach, but in the duodenum was a circular scar involving mucous and muscular coat with some narrowing of the intestine, indicating a perfectly healed ulcer.

There were no adhesions between costal and lung pleura, or other evidence that the railway accident had injured the lung at all.

The history and condition did not indicate a fractured rib. A section of the pathology was sent me, and examined by Dr. W. C. Mitchell with the following result:

"All of the specimens of tissue sent me proved to be carcinomatous, the areas surrounded chiefly by fibrous tissue; one specimen was evidently a lymphatic gland numerous foci of carcinomatous cells."

I received no specimen of the intestinal lesion, but Dr. Allen writes that section of it did not reveal carcinoma cells. While cases of primary carcinoma of the lungs are now and then reported, they are rare, and I do not present this as a convincing one, yet unless there was some error concerning the duodenal lesion, it seems probable that it originated in the bronchial or lung tissue. The patient told me that he had never suffered pain, but about a year before the fatal illness some indigestion of short duration, which was, probably, caused by the lesion of the duodenum disclosed by postmortem.

I have nothing to offer for the relief of this very distressing condition, whether primary or secondary, unless it should come from the application of the Roentgen rays.

For the clinical history of the following case of pancreatic cyst, prior to being referred to me, I am indebted to the attending physician, Dr. T. B. Gormly of Windsor, Colo.

Mrs. C. C. L., aged 37, wife of a farmer, youngest child 10 years old. Personal and family history good. Never before had any serious illness. Was taken suddenly March 3, 1903, with severe epigastric pain, for which a hypodermic of morphia was given. Temperature normal, pulse 120. Patient very fat, weighing over 200 pounds. Next seen April 4, when pulse was 90 to 108, temperature 100.5, and pain and tenderness in the epigastrium, and extending to the left, persisting. Seen again April 19, suffering much from gas in stomach and indigestion, with occasional vomiting; pulse 120, temperature normal, but losing strength and flesh rapidly. Palpation showed tumor in the left upper quadrant. Stomach rejected food and rectal alimentation commenced and continued from this date, during which time

tumor increased in size; temperature varied from 100 to 100.5, being on one occasion 101, and pulse 115 to 125. On May 8 advised exploratory section. On May 18 patient reached Denver and was placed in my charge. At this time her temperature was 97.5, pulse 104. A large, smooth, oval, immobile tumor was easily outlined, occupying epigastrium and left hypogastrium, extending downwards one inch below horizontal line from the umbilicus, and one and a half inches to right of middle line from ensiform cartilage to umbilicus. The abdominal wall was so thick from fat that fluctuation could not be detected. Monro says: "Almost all patients are markedly fat."[3]

No diarrhea, no previous examination of urine, but no sugar nor albumin now in urine. Blood examination by Dr. W. C. Mitchell showed it to be practically normal.

She has had no fall nor injury. No jaundice, though a slight staining of the conjunctiva exists. No history of gallstones. From a careful consideration of the clinical history, and the differential diagnosis as to adrenal, kidney, gall bladder and omental cysts, and especially hydatid of the left lobe of liver, I concluded it was a pancreatic cyst. This opinion was shared by Dr. J. N. Hall of Denver. At the same time it must, at present, be admitted that no absolutely positive diagnosis can be made without operation. Aspiration for diagnostic purposes is often more dangerous than incision, so I determined to operate, and May 23, at St. Luke's Hospital, made an incision three inches long in the middle line from umbilicus upward. The wall was nearly three inches thick in fat. The sac was adherent to the abdominal peritoneum, which was quickly opened, and at least a gallon of chocolate-colored liquid was evacuated. Further examination with fingers and long dressing forceps showed that the cavity included the lesser peritoneum, extending to the left lumbar costal angle. The sac was thoroughly washed out with warm salt solution,

3. Jour. A. M. A., 1902, vol. xxxix, p. 809.

and a six-inch rubber drain half an inch in diameter with shoulder at inner end, inserted. There was a free sero-sanguinolent discharge, with some pus, for a day or two. The discharge diminished rapidly and changed, being more purulent with thick dark-colored material, which I regarded as due to sloughing, and which ceased at end of first week.. The parts were now contracting and closing on the tube tightly so it was partially withdrawn, and three inches cut off. The day after operation the temperature was 100.5 and pulse 108. From the third day until date of discharge, on June 16, twenty-four days after operation, the temperature ranged from 97.5 to 98.5 and pulse from 80 to 100. Before discharge a small short drainage tube was inserted, and the wound closed permanently in ten days. She suffered greatly from dyspnea before operation. The digestive and gaseous disturbance continued severely for two months. Her digestion is now very good and strength and weight have improved in marked degree, and except for tingling and some numbness in hands and feet, which is disappearing, she writes me that she considers herself quite well. The contents of the sac were examined and a large number of fat, blood and pus cells were noted. Trypsin was absent, as usual in large cysts. Feces were not examined. The suggestion to open the cyst in the costo-vertebral angle, because shorter and more direct, and more dependent, therefore favoring more perfect drainage, is a good one, and in a future case I should do it, but should make the anterior "incision" first, both to confirm the condition and to facilitate the posterior operation, closing the anterior incision at once, or within a few days.

The cause of pancreatic cyst is doubtless due usually to obstruction of the pancreatic duct by stone, as suggested by Senn, and endorsed by some other observers; the obstruction being due to calculus or interstitial pancreatitis. Most writers agree that hemorrhage is not a primary cause of cyst, though admitting that it is at least

a secondary phenomenon, and itself may be due to obstruction of one or both pancreatic ducts. Stone in the common bile duct, by closing the duodenal orifice of the pancreatic ducts, is an admitted cause. Lloyd says that effusion into the lesser peritoneum has been mistaken for pancreatic cyst, but the mistake is improbable when one remembers that this effusion, independent of pancreatic disease, is rare, and is due usually to injury, and the injury which produces this will generally damage the pancreas. It is entirely improbable from its location that the pancreas can be seriously injured without affecting other parts, and effusion into the lesser peritoneum as a consequence of pancreatic disease is common. The tail of the organ is believed to be the most common seat of cyst, and the head more frequently affected in carcinoma. Cases of cyst have been reported which presented no evidence of obstruction by calculus. No satisfactory evidence of stone exists in the case I report. The belief that inflammatory conditions will result in hemorrhage and cyst is justifiable.

Opie has demonstrated that the injection of healthy bile into the pancreatic duct of animals will produce hemorrhage and fat necrosis. Infected gall bladder and ducts will, through the pancreatic duct, infect the pancreas. Hemorrhage is common in icteric cases, and the statement that pancreatic hemorrhage is more common when the jaundice is due to pancreatic obstruction than when it is due to gallstone obstruction, is a rational one. Blood condition is the probable explanation. Though diabetes is common without disease of the pancreas, Opie has demonstrated that total destruction of the pancreas is followed by diabetes, but partial destruction is not. Investigation tends to prove that the latter is due to the fact that the islands of Langerhans, certain secretory cells of the gland, are not destroyed. When diseased or destroyed, diabetes results.

Robson and Moynihan state that free fat in the feces is more common than sugar in the urine, the latter not

being present in most of the reported cases, and when found, Flexner shows, was only in the first few days of the history. Robson says with the history of indigestion, sugar in urine, fatty diarrhea, loss of flesh and bronzing, pancreatic disease exists; also that acute epigastric pain, followed by a circumscribed inflammation, tenderness and tumor, with indigestion, is strongly indicative of pancreatic cyst. Without an intelligent clinical history the diagnosis is guess work.

A review of reported cases and literature shows convincingly that the disease is essentially surgical, and that delay in operating is as dangerous and fatal as in appendicitis. The gangrenous cases can only be saved by promptly opening the abdomen and draining. Formerly and recently reported cases[4] by Woolsey, which seemed unfavorable for operation, amply attest this.

The general suggestion of treatment of the sac is to dissect it out if small, but in the case of a large sac this attempt is manifestly unsafe and dangerous. The extensive adhesions make it exceedingly difficult and extravasation of pancreatic juice or septic material would probably destroy the patient.

Several patients have died from this treatment; while to attach the sac to the abdominal peritoneum if not already adherent, and drain is safe, and undoubtedly the best treatment of the large cyst. Pancreatic juice out of its normal channel produces, as is well known, fat necrosis. Pancreatic disease often simulates intestinal obstruction, and the statement may be safely accepted, that if the surgeon opens the abdomen, and does not find obstruction or perforation of the stomach, but does observe fat necrosis, the pancreas is, in all probability, the source of the trouble. The small number of cases reported, and the limited experience of the profession in the treatment of this disease, will, I trust, secure your indulgence of the extended remarks.

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4. Annals of Surgery, November, 1903.

## DISCUSSION.

DR. JAMES E. MOORE, Minneapolis, Minn.—My experience with pancreatic cyst is comparatively limited. I have had but one case, the diagnosis having been made postmortem, so that my ideas with reference to therapeutics would not be helpful. However, I am glad to have heard the paper, because in the future I hope, by following the author's suggestions and those of others, I will be able to make a diagnosis in the next case before the patient dies.

DR. M. L. HARRIS, Chicago, Ill.—I wish to say a word or two in reference to the diagnosis, and to speak of the great value of colonic distension with air. In going over the subject some time ago and collecting all of the cases of pancreatic cyst I could find, it was found that in 95 per cent. of the cases the cysts lay above the transverse colon; that is to say, the transverse colon takes a distinct circle below the tumor and the stomach above. There is practically no other tumor in which this relation is found. This is, therefore, a very important point in the diagnosis. If the transverse colon takes a circle below the tumor and the stomach is above, then the tumor is probably pancreatic. It is the most important single factor we have in the diagnosis of pancreatic cyst.

DR. J. W. BULLARD, Pawnee City, Neb.—Illustrative of the difficulty of diagnosis in cyst of the pancreas, it was my privilege a few years ago to be present at a clinic held by Dr. Charles McBurney in the Syms amphitheater of the Roosevelt Hospital in New York. The patient, a man of probably 35 years of age, had been subjected to a crushing injury some three or four weeks before and then had a greatly extended abdomen, the principal enlargement being above the umbilicus. He had lost forty-five pounds in weight since the injury. Dr. McBurney expatiated at some length on the possible pathological conditions, and then on the probable. He opened the abdomen above the umbilicus and then kept extending the incision downwards till he was well down towards the pubes, all the time exploring and trying to make out what he had; when suddenly he discovered that it was a pancreatic cyst, which he had not even mentioned as a possible condition. One point I wished to make in considering the diagnostic signs has already been spoken of by Dr. Harris, and that is the relative

position of the transverse colon, it nearly always skirting the lower border of the tumor.

Dr. Grant (closing the discussion)—I would like to make one suggestion as to the point made by Dr. Harris, which has been considered by several writers. When it is remembered that pancreatic cyst is more frequent in very fat subjects, and that there is quite uniform distension of the intestines, the stomach not being so much distended because of the pressure of the tumor, or if so, it is entirely out of its normal location, it is difficult, if not impossible, to isolate the transverse colon and the stomach.

Dr. Harris—You can do it by artificial distension, Doctor.

Dr. Grant—That would do as to the stomach.

Dr. Harris—And the colon, too.

Dr. Grant—I have never succeeded in getting any benefit from that in other cases. I did not try it in this case, but in a case of very fat abdominal wall and general distension of the abdomen, unless it can be isolated, it would make it of doubtful diagnostic value.

# ACCIDENTAL PERFORATIONS OF THE UTERUS.

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DES MOINES, IOWA.

Accidental perforations of the walls of the uterus by instruments in gynecological practice and in efforts to produce abortion are probably more frequent than the reports of cases would appear to show. The circumstances under which these accidents occur are generally such as would lead them to be passed over and the results which sometimes follow are often no doubt assigned to other causes.

Dr. Brothers of New York has been able to collect sixty-six recorded cases of accidental perforations of the uterus, of which seventeen died and forty-nine recovered.

The use of the sound and the curette in gynecological practice is probably the most frequent cause of this accident in legitimate practice. The facility with which the sound can be used in exploring the interior of the uterus and in repositing a retrodisplaced organ is no doubt responsible for some of these accidents.

There are no means by which we are able to measure the resistance which the uterine walls may offer to the passage of an instrument, or to determine the ease with which the walls may be penetrated. It is well recognized that when the tissues of the uterus are much softened by inflammation or by degenerative changes in connection with disease that a curette or sound will pass through

into the abdomen with so much ease that the fact may not be at once recognized, and it may be sometimes assumed that the depth of the uterine cavity is much greater than the facts will warrant, or it may be thought that the sound has passed into a Fallopian tube. It is possible that the instrument has been diverted into the tube, but the probabilities are very much greater that the abdominal cavity has been entered.

When the walls of the uterus are apparently healthy they may be penetrated with greater facility than is generally supposed. This fact will be illustrated by a case related in this paper. While I have never had the accident happen in my own practice, I have always been apprehensive of it, and have been governed by a degree of care which has equaled that exercised in any work I do. There can be no doubt that examinations of the uterus by the sound are altogether more frequent than they should be. I am so certain that information as to the condition of the uterus can be better obtained by other means that I rarely use the instrument.

The curette is no doubt a very useful instrument in a certain class of chronic intra-uterine affections, and often indispensable, but at the same time a very dangerous one. I am quite sure that it is often used in an indiscriminate manner, and as a routine treatment in a great variety of uterine difficulties that could be better treated by other means with a greater prospect of permanent results.

The perforation of the uterine walls by the curette would not be so serious if it were not for the associated treatment which is so often regarded as essential when the curette is indicated. I refer to irrigations. If the the uterus is perforated and irrigation is employed a considerable amount of infection material may be washed into the abdominal cavity and the chances of setting up a fatal peritonitis are great. The infection from the curette is serious enough, but when in addition to this the washings from the uterus are carried into the peri-

toneal cavity, the risk is greatly increased. It should be remembered that when the curette enters to an unexpected depth there is a great probability that the instrument has passed through the walls and the irrigation should be refrained from unless it can be absolutely demonstrated that no perforation has taken place.

Our attention is called from time to time to cases where simple curettage has been performed, followed by a fatal result. It may fairly be presumed that in some of these cases the uterus has been perforated and the peritoneal cavity infected without the knowledge of the operator. Indeed, we have known of cases where not only were the uterine walls perforated, but a considerable quantity of gauze was packed into the abdominal cavity through the opening in the uterus, which was only discovered on postmortem examination.

In April of this year a case came under observation which illustrates the ease with which a perforation of an apparently healthy uterine wall can be accomplished, and what needs to be done in cases of this kind.

CASE.—A woman about thirty years of age had acquired considerable skill and dexterity in producing abortion by introducing instruments into the uterus. Suspecting herself to be pregnant or of the possibility of being pregnant, she, about 4 o'clock in the afternoon, straightened out a hairpin, then bent the end over on the main stem to make a close loop so as to avoid the sharp end which she thought might injure the uterus. She then lay down and introduced the loop end of the hairpin into the uterus, allowing the opposite end to project from the os so that she might remove it at pleasure. After resting in bed two hours she attempted to seize the pin with thumb and finger to remove it, but it slipped from her fingers. She attempted to seize it again, and again it slipped from her and disappeared within the uterus. She at once summoned her doctor, who attempted to secure it with a pair of uterine dressing forceps, but failed. The woman was now in great fear of

the results, and her physician finally persuaded her to go to the hospital, where I saw her the next morning. She was so certain that the hairpin was in the uterus or the abdominal cavity that she was willing to submit herself to any operation that was deemed necessary to secure it. The patient was anesthetized, the cervix diluted and the uterine cavity explored with a large blunt curette, but nothing could be felt. The abdomen was opened and the uterus freely exposed. The organ was perfectly normal in size and appearance and free from any evidence of recent or old inflammation or of adhesions. Almost directly at the apex of the fundus there appeared to be a small opening through which I could pass a small probe into the body of the organ. It was now apparent that the hairpin was somewhere in the abdominal cavity. The hand was passed freely in among the intestines, and after a little exploration the lower end of the pin was discovered high up in the left side of the abdomen, the upper end very near the diaphragm. The bent upper end constituted something of a hook which caught in the tissues and would not come down without using force, which might seriously injure the intestine or omentum. A pair of broad ligament forceps was clamped on the lower end of the pin to steady it so that the hand could be withdrawn from the abdomen and a second incision was made at the inner curvature of the ribs, through which I grasped the upper end of the pin, which was pressed against the abdominal wall by the forceps from below. I found the hook on the upper end of the hairpin entangled in the omentum, and it required some little manipulation to set it free. The pin was removed and the abdominal wounds tightly closed. The patient made an uneventful recovery.

Several years ago a female doctor, whose practice consisted largely in producing criminal abortion, undertook the treatment of a case of supposed pregnancy. It was said that the woman had passed her menstrual period a few days. The doctor, in her testimony on the trial of

the case, stated that she simply introduced into the uterus a soft rubber catheter in the evening, and the next morning on attempting to remove it found it had disappeared. There is reason to believe, however, that before introducing the catheter she had employed a uterine sound to explore the uterus. It was admitted that in searching for the catheter later in the day with a pair of long dressing forceps she caught something which she supposed to be the catheter, and on pulling it down she discovered—after eighteen inches of what proved to be small intestines were outside the uterus—the nature of the object which she had found.

A surgeon was called, but did not feel prepared to do an operation until the next morning. When the abdomen was opened the catheter was found among the intestines and eighteen or twenty inches of small intestine more or less separated from its mesenteric attachment. A resection and Murphy button were used, but the patient died on the operating table. It was claimed that the catheter itself perforated the uterine wall; on this point, however, we have no absolutely reliable information.

There can be no doubt that the uterine walls can be perforated with unexpected ease when in a normal condition, and with much greater ease in certain states of disease. It has been stated that the accident is of comparatively small importance and no serious results will come from it. While this may be true, at least to a certain extent, the admission must be restricted in view of the fact that of the recorded cases about 25 per cent. have proved fatal. Perforations with a sound which has been properly prepared for exploring the uterus will not generally be followed by serious consequences. Perforations with a curette are much more dangerous on account of the larger size of the instrument, and also on account of the possible laceration of the uterine tissue in the curetted area. If there is added to this an intrauterine irrigation the danger is greatly increased.

A few cases have come to my knowledge of perforation of the uterus by the curette followed by irrigation, and the operator, apparently not satisfied with the thoroughness of his procedure, packed a considerable quantity of gauze, which on postmortem was found in the abdominal cavity.

The treatment of accidental perforations of the uterus will depend on the nature of the instrument used. Unfortunately, the circumstances under which many of these accidents occur will often be a bar to proper treatment. In efforts at criminal abortion the ignorance or dishonesty of the operator will effectually interfere with a discovery of the condition of the patient until it is too late for an early operation to be of avail. In the cases which occur in legitimate practice the fear of censure or of malpractice, even if the accident is discovered at the time, will have its influence on the nature of the efforts made.

Dr. Brothers relates that in four cases of perforation with the curette in his own practice, three were successfully treated by rest and local application of ice, while in one the fundus was delivered through an anterior vaginal incision and the opening closed with catgut sutures.

Rosenfeld treated a case in a similar manner. Glaser and Kentman each mention a case of perforation with a curette which was treated by hysterectomy. Schwartz, while curetting after an abortion, perforated the uterus and packed the organ with gauze. The patient, after an attack of circumscribed peritonitis, recovered.

Queisner treated a case by tamponing the uterus, applying ice and giving opium. Guerard, Billroth, Man and Alberti each performed a laparatomy for the repair of perforation. In three of these cases the intestine had passed into the body of the uterus and in two the intestine was resected. All recovered.

If the perforation is small and made with clean instruments and if irrigation is not employed, rest and the

application of ice will generally be followed by recovery with probably nothing more serious than a circumscribed peritonitis. If irrigation has been employed one of two courses of action will be necessary. If the infection is mild the treatment by rest and ice may be sufficient. If the infection is of a character to excite a septic peritonitis a vaginal hysterectomy with drainage will be indicated. In the milder form of infection there is danger of chronic inflammatory processes occurring in the pelvic connective tissue or peritoneum, leading to abscess formation and the train of sequences which so often attend chronic infection in this region, and will require the treatment usually demanded in such condition. If the perforation is more extensive or is made with a large size curette, the fundus may be delivered through an anterior vaginal incision and the wound in the uterus closed by sutures, or, as will happen in some cases of perforation resulting from a curettage preliminary to some operation on the uterus through the abdominal wound or by the vaginal route, the choice will be a suturing of the wound or a hysterectomy, as the conditions may indicate. As an immediate operation a hysterectomy is not often demanded unless the organ has undergone some degenerative change. It is certainly not good surgery to allow an opening of any considerable size to go unrepaired, not only on account of the danger of infection of the peritoneum, but on account of the danger of the intestine escaping through the opening in the uterus and becoming strangulated, as actually occurred in several cases.

## DISCUSSION.

Dr. Donald Macrae, Jr., Council Bluffs, Iowa—I wish to report a case which I consider rather unique. It occurred in the practice of a young physician who had graduated some three months previously. The interest of the case depends largely upon two points. First, the perforation was not caused by the use of the curette, but by a modified Goodell dilator. The perforation was

not in the fundus of the uterus, but in the cervix, that is, the upper part of the cervix, the body of the uterus proper not having been opened. Second, the intestine, which was pulled down through the opening, was not cut off, but pulled off.

These two features are interesting from the fact that I have been unable to find any literature bearing upon the subject of this particular case. I was called to see the patient three hours after the accident happened. Operation consisted of an attempt to curette the uterus, which had practically no pathology. There was slight bleeding at times, following a miscarriage some months before. The woman was apparently perfectly well, but it was decided to curette the uterus, and try to arrest this hemorrhage, thinking the foreign matter might be removed very easily. The dilator was forced through the side of the uterus at about the internal os, perforating the left side of the uterus, and passing through the broad ligaments into the pelvic cavity. The mistake was not recognized; but the opening was enlarged by means of a dilator until sufficient dilatation of the cervix had taken place, when an instrument was inserted and a loop of intestine brought down. This loop was taken for a membrane, and after pulling it out a certain distance and meeting with resistance, the mass was pulled off by actual force. There were twenty-eight inches of small intestine out on the table when I arrived some three hours later. The woman died just as I walked into the room.

A postmortem examination was held and the abdominal cavity was found full of blood, hemorrhage having taken place from the mesentery, and not from any perforation of the vessels near the uterus. The woman bled to death. I found still hanging to the cecum about four inches of the small intestine.

This case would have been a suitable one for immediate operation, for the reason that this pulling-off process had acted in the same manner as the twisting of a blood vessel, the folds of intestines having invaginated themselves so that there was no fecal extravasation into the peritoneal cavity until I inserted my finger and pulled the serous invaginated portion out, and then fecal matter became evident.

I refrain from mentioning any names in connection

with this case, but if there is any member who may wish to know further particulars about the case I shall be glad to furnish the details necessary.

Dr. H. G. Wetherill, Denver, Colo.—The profession and the public ought to be congratulated on the stand surgeons and general medical men are now taking in regard to the use of the curette. The great dangers that have been associated with the use of this instrument, not only in the hands of inexperienced men, but in the hands of experts, are beginning to be recognized.

There is one point in Dr. Fairchild's paper which ought to be a little more elaborated at this time, and that is the very great danger of irrigations after curetting, and particularly irrigations with antiseptic solutions. I think we are beginning to grasp the fact that irrigations after curettage do good chiefly by their mechanical influence in removing foreign bodies loosened up by the curette, and that they do mighty little good, and have great capacity for harm, because the solutions are antiseptic. The possibility for harm is tremendously increased where perforation has occurred if antiseptic irrigations are used.

I am one of those who are willing to admit accidental perforation of the uterus at my hands. I have had that experience. It was a case of after delivery at term. The ease with which the curette slipped through the soft uterus was a great source of astonishment. It slipped through just as a sound would through wet paper. I have used the curette a great many times, and I think I know how to use it fairly successfully. Fortunately, this was a case in which an operation for retrodisplacement of the uterus was necessary. We went ahead with the operation, brought the uterus forward and fastened it to the abdominal wall. The perforation in the uterus was a small one and was sutured. No irrigations had been used, and if it had not been for the necessity of correcting the retrodisplacement, I should have had no hesitation in packing the uterus lightly with gauze and leaving it alone, for a simple accident of perforation of the uterus is not necessarily a serious one, and if the perforation is small it is much better to leave it alone than to undertake to treat it by an abdominal section. If irrigation has been used, and particularly if it has been of some antiseptic material, bichlorid of mercury or something of the sort, then a radical

operation for the closure of the perforation and for the washing out of the abdominal cavity may be necessary.

In this connection I wish to refer to the classic case with which you are all doubtless familiar, which occurred in New York. You will recall that the woman had attempted to induce an abortion upon herself by introducing an umbrella rib into the uterus. It went through the posterior vaginal wall and, when found at the autopsy, had perforated the liver and diaphragm and was found in the right pleural cavity.

Dr. John W. Bullard, Pawnee City, Neb.—Illustrative of the ease with which an instrument, such as the curette, can perforate the diseased uterine wall, I desire to mention my own experience. The wife of a confrère was three days sick with rheumatism; she had swollen joints and swollen tendon sheaths. I thought it was a septic condition. Finding a foul vaginal discharge, I made an examination. The cervix was dilated so as to admit the index finger. No attempt was made to curette the uterus. The condition of the woman was grave. A probe wrapped heavily with cotton, of the size of my little finger, and dipped in carbolic acid, was introduced, with which I attempted to swab out the interior of the uterus. The swab, probe and all passed through the uterine wall without much force. The woman died in the course of twenty-four hours.

In another case a perforation of the uterus was produced in an attempt to induce miscarriage. The woman herself introduced a bone crochet hook of ordinary size into the uterus, which broke off and could not be recovered. I was called by the attending physician to assist him in this case. We dilated the cervix so that the finger could be readily introduced, but could not find the foreign body. The patient was left alone. Six months after this she became pregnant, and later the crochet hook was discharged through the anterior abdominal wall. The woman, meanwhile, went about her usual work, not having been sick, and suffering scarcely any pain. Some months later the product of conception was delivered in the natural way.

Dr. Fairchild (closing the discussion)—The object of my paper was not to relate unusual cases, but simply to give expression to opinions I have held for some time, namely, that the curette is a much more dangerous instrument than we have been generally taught. Most of

us are agreed upon this point, and none of us would use the curette indiscriminately or carelessly. However, there are many practitioners who think the use of the curette is essential in a great variety of conditions. They think they have not done their patients full justice unless this instrument has been employed. It is often used without a clear conception of how much resistance the uterine wall will offer, and this has led to the feeling that the uterus can be curetted with safety, and not a few practitioners feel that it is necessary to do something for their patients, and then the curette was called into requisition; they used it with the idea of performing a simple operation. The tendency among surgeons is to lessen the frequency with which this instrument is employed, and the moral effect of this on the average general practitioner will be good. I have cited cases to show that in some instances, even in a uterus that appears to be perfectly healthy, the curette will pass through the walls with considerable ease. Of course, a good deal will depend upon the angle at which the instrument strikes the wall of the uterus.

The question comes up, What shall be done? When the curette has perforated the uterus, and done considerable damage, the physician hesitates to explain to the family what has happened, and he feels that he will be censured if he reveals the fact and undertakes to do anything to repair the damage. It requires a considerable amount of moral courage on the part of the man who has this accident happen to him to advise the patient and friends as to what ought to be done in the way of repair. In some cases, where there has been no irrigation employed, a small perforation may not be serious. If it is large, considerably more damage will have been done, and not only will there be great danger of infection, but a loop of intestine may slip into the wound and become strangulated. It is not for the purpose of citing unusual cases, but simply to call attention to important facts bearing upon this very common practice, that I have read this paper.

# THE TREATMENT OF GASTRIC ULCER.

H. D. NILES, M.D.
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For many years it has been known that approximately 5 per cent. of the human race at some period of their lives suffer from gastric ulcer; that 10 per cent. of these patients die from perforation or hemorrhage; that the lives of 15 per cent. are materially shortened and the health, happiness and usefulness of the remaining 75 per cent. more or less impaired.

It is equally true that until very recently our knowledge of the causative and resultant pathology of gastric ulcer was limited to dead-house findings; our methods of diagnosis to a study of symptoms and an application of laboratory tests, and our treatments to medicinal and dietetic measures.

All candid, experienced men who thoughtfully accept these statements, must be impressed that a large majority of these victims of gastric ulcer lived and suffered, or perhaps died, with the real cause of their distress unrecognized, untreated or mistreated; and that our treatments at best were indirect and uncertain, based upon an obscure pathology and a doubtful etiology, and restricted by the prevailing exaggerated ideas of the dangers of all surgery done in the upper half of the abdomen.

I take it, therefore, that if we are ever to evolve any hopeful plan for reducing the mortality and misery that has attended gastric ulcer in the past such a plan must include:

1st. An earlier and more positive diagnosis.

2d. A clearer comprehension of the causative and resultant pathology.

3d. An adoption of the rule that all inflammatory or necrotic lesions starting in the mucosa and tending to extend to and include the peritoneum should be regarded as surgical affections.

4th. Due consideration of the anatomic relations and physiologic functions of the stomach.

### EXPLORATORY INCISION AS A MEANS OF DIAGNOSIS.

The first step toward the rational treatment of gastric ulcer is a positive diagnosis. From postmortem statistics we learn that in a considerable proportion of persons presenting postmortem evidence of gastric ulcer the disease was not even suspected in life, and in most instances a positive diagnosis had not been made. These oversights and doubts will continue to embarrass the medical attendant and bring disaster to the patient until the former acquires the habit of suspecting every obscure chronic disease of the stomach of being gastric ulcer, unless the subjective and objective symptoms and the application of modern laboratory methods furnish absolute proof to the contrary, and until he is willing to recommend an exploratory incision in all cases where any serious or significant symptoms are present and the ordinary means of diagnosis are ineffectual.

We are certainly not justified in subjecting our patient to the danger of sudden death from perforation or hemorrhage, or even to the distress that belongs to most gastric ulcers, when so safe a procedure as an exploratory incision is at our command and will remove our doubts and enable us to take timely precautionary measures if necessary, and until our colleagues, the internal medicine men and the laboratory workers, evolve something more definite and conclusive as a diagnostic test than they have yet produced, we will often find ourselves compelled to resort to the exploratory operation.

## CAUSATIVE AND RESULTANT PATHOLOGY.

The excessive frequency of gastric ulcer as compared with ulcers in other parts of the body, admits of but one explanation, viz.: there must exist certain local conditions that render the stomach especially susceptible to ulceration. I am convinced that these local conditions frequently do exist and that they will become apparent to those surgeons who take into account the well-known digestive action of the gastric juice upon devitalized or partially devitalized tissue, and recall that the stomach is almost invariably brought into the most intimate relation with every infection that invades any part of the peritoneal cavity by means of the richest possible vascular connection, the omentum.

Any one who has done much gall bladder, appendiceal or tubal work will testify to the frequency of these omental attachments, connecting, as they do, the stomach directly with these infections and often in a way to drag on portions of the stomach. Thus the carrying of infected emboli, the immobilization of certain parts, and the local circulatory disturbances all tend to favor local degenerative changes; and the presence of emboli, or any disturbance of the blood or nerve supply or any interference with the normal mobility of any portion of the stomach are sufficient and probable factors in the production of a *locus minoris resistentia,* and upon which the digestive or corroding powers of the gastric juice may act and produce ulceration. These facts if accepted and utilized will often aid us in our diagnosis, and should not infrequently influence our treatment.

The scope of this paper will not permit our dwelling upon this question of etiology, but at some future time I hope to bring before this society further evidence, both clinical and experimental, showing the intimate causative relationship that exists between inflammatory lesions in any part of the abdominal cavity, and gastric ulcer. It is probable, too, that gastroptosis or any loss

of muscular tone that permits sagging of portions of the stomach walls, renders those dependent parts more susceptible to the digestive effects of the gastric juice and favor ulceration. We can not on this occasion take time to review the course and various terminations of gastric ulcer further than to recall to your mind the causative relation that gastric ulcer bears to cancer perforation, hemorrhage, subphrenic abscess, hour-glass contraction, pyloric obstruction and the involvement of nearby organs and tissues. Suffice it to say that Fenwick estimates from postmortem statistics that adhesions occur in all cases of chronic ulcers involving one or more of the following organs or tissues named in the order of frequency, viz.: pancreas, liver, colon, spleen, omentum, diaphragm, and abdominal wall.

At the present time this resultant pathology is usually the first recognized indication for treatment, but it is to be hoped that in the near future earlier diagnoses and timely preventive measures will do away with much of this resultant pathology, and we will be able to eliminate a large part of the misery and mortality that inevitably belong to perforation, hemorrhagic and malignant cases.

GASTRIC ULCER IS ESSENTIALLY A SURGICAL AFFECTION.

In making this statement I do not undervalue the usefulness of rest, dietetic and possibly medicinal measures in those cases where the ulcers tend to heal spontaneously, but it is irrational to suppose any but surgical measures can exercise any controlling influence over any progressive acute or chronic ulceration or can remove the existing cause or combat the various sequelæ of such ulceration as hemorrhage, scar tissue, perforation, cancer, etc.

Both surgeons and patients have in the past been restrained by an exaggerated fear of operative procedures in the upper half of the abdomen, and this excessive apprehension, coupled with the diagnostic doubts that

prevailed in the ante-exploratory days, have doubtless served to prevent the surgical diseases of the stomach receiving rational treatment as early as they otherwise would. But since it has been demonstrated that the stomach is as safely accessible to surgery as the organs of the lower half of the abdomen, there must be very few exceptions to the rule quoted above, viz.: All inflammatory or necrotic processes starting in the mucosa and tending to extend and to include or penetrate the peritoneum, should be regarded as surgical affections.

I do not understand that the adoption of this rule implies that we should operate upon all cases of gastric ulcer the instant a diagnosis is made, but I do believe that those who view this morbid condition as a surgical pathology and are able to draw a mental picture of its possible or probable course, termination and complications, will be the best judges of how long to trust to nature's reparative powers and how soon surgical intervention is demanded.

The surgery of gastric ulcer is still very young and as yet no hard and fast rules should be adopted for deciding exactly when, or precisely how, we should attack this pathology with the knife. There are some conclusions, however, that seem confirmed by experience that I believe should influence our practice.

When in the consulting room or at the bedside we are confronted by a patient who is evidently suffering from an obscure chronic disease of the stomach, we should be quick to suspect gastric ulcer and apply the proper tests to confirm or dispel our suspicions. If the mildness of the symptoms permit, we may during our period of doubt even employ some conservative rest treatment for the stomach; but if this prove ineffectual and we are still in doubt, or the symptoms are at all urgent or significant, it is our duty to advise an exploratory incision at once for diagnostic purposes.

In perforation of the stomach into the general peri-

toneal cavity there can be no difference of opinion. A prompt operation, thorough cleansing of the abdominal cavity and perfect repair of the stomach perforation are imperative. When a perforation results in the formation of a perfectly walled-off cavity, we should certainly open and drain, but I believe that repair of such perforations may often be temporarily postponed.

In gastric ulcer, attended by serious hemorrhage, we should remember that 4 per cent. of all cases die of hemorrhage, and that excision of the ulcer, or opening the stomach and directly attempting to control the hemorrhage, are procedures that (judging by past experience) do not promise to reduce this mortality. We have, however, a more promising procedure that can be speedily executed with but little shock, which I believe should be employed as early as possible in all these cases, viz., gastro-enterostomy. So far as I can learn Moynihan was the first advocate and employed this means of favoring nature's efforts to control gastric hemorrhage, and at the same time encourage cicatrization of the existing ulcer or ulcers.

In the absence of symptoms of perforation or hemorrhage we may plan and execute any necessary procedures more deliberately. Where possible and practicable the primary local cause should be removed. In a considerable number of open ulcers I believe this alone may effect a cicatrization, and in all (where such causes are discoverable and removable), I think the correction of the initial causative pathology is an additional safeguard against recurrence.

Hence in studying the history we should take into thoughtful consideration any account of previous abdominal inflammation as appendicitis, cholangitis, pyosalpinx, etc. Evidence of a previous local or general peritonitis, especially if treated non-surgically, indicates the situation of a past or perhaps present infection, doubtless connected with the disease of the stomach

through the omentum or peritoneal adhesion, and constituting the probable primary cause of the gastric ulcer.

I could cite many cases that to my mind illustrate this causative relationship, causes which in the past have been explained on the unproved nervous reflex theory.

The removal of the primary cause will not usually suffice where a large open ulcer or a cicatrized ulcer is situated near the pylorus and pyloric obstruction is threatened or already exists. Such cases, and they constitute the majority of those presented for operation, require rest for the ulcer and a sufficient outlet for the stomach contents. A pretty careful consideration of the various methods proposed with these objects in view leads me to prefer, as a rule, a posterior gastro-jejunostomy, using sutures without the aid of mechanical appliances.

Dilatation of the pyloric orifice with the finger through an opening in the stomach seems illogical and crude, and I believe usually proves ineffectual and unsafe.

Pylorectomy is, I am sure, more difficult and dangerous than gastro-jejunostomy, and even if successful, accomplishes no more.

Some form of pyloroplasty, including the Finney operation, may be found applicable to exceptional cases, but they all involve the risks and uncertainties of surgery done in scar tissue; moreover, they are more difficult to execute, require more time in their performance and do not usually insure the same rest to the ulcer that an opening in the most dependent part of the stomach does.

Excision of the ulcer, whether cicatrized or open, would at first seem to be the ideal surgical procedure, but in actual practice we rarely find cases where it meets the indications so completely and so safely as the other measures referred to, and the unsatisfactory results and mortality attending excisions up to the present time are apparently dependent upon conditions that no refinement of the procedure is likely to meet and overcome. The performance of a posterior gastro-jejunostomy with su-

tures can be accomplished easily, speedily and effectually by any one who will take the time to familiarize himself with each step of the operation, and acquire a reasonable degree of dexterity by practice upon animals or the cadaver. The least possible exposure, a good sized opening in the most dependent part of the stomach, drawn through the mesocolon and connected with a similar opening in the jejunum at about five inches from its attachment, the use of Doyen's clamps and silk sutures as described by Moynihan are, I think, the salient points of the procedure best adapted to most cases.

The conclusions suggested by the foregoing considerations may be briefly summarized as follows:

1. Postmortem statistics, clinical experience and recent operating room observations all tend to confirm the belief that neither the frequency nor the grave importance of gastric ulcer is fully appreciated by the profession generally, and the majority of cases are not recognized as such in life.

2. An earlier and more positive diagnosis means greater alertness in our observation and interpretation of symptoms and more frequent exploratory operations.

3. In the history of every benign or malignant ulceration situated in a safely accessible region there is always a time when the pathology can be corrected or favorably modified by appropriate mechanical means.

4. Up to the present time the recognized indications for operative procedures in gastric ulcer have been the symptoms produced by the remote resultant pathology, as hemorrhage, perforation, pyloric obstruction, etc., but our aim should be to make an earlier diagnosis and by the timely application of a rational treatment prevent the occurrence of these late and more serious manifestations of ulcer.

5. Taking into stricter account the local etiologic factors will undoubtedly aid us in the prevention, diagnosis and treatment of gastric ulcer.

6. The causative pathology deserves more consideration in the surgical treatment of gastric ulcer than it has yet received.

7. Perforation always demands the promptest surgical interference.

8. Hemorrhage from gastric ulcer is best treated by gastro-jejunostomy.

9. Open or cicatrized ulcers near the pylorus always indicate rest for the parts and a sufficient outlet for the stomach contents.

10. A posterior gastro-jejunostomy with sutures accomplishes these objects with the minimum risk and the most satisfactory results, and hence should usually be the operation of choice.

11. Our future advancement in the treatment of gastric ulcer must come from an earlier recognition and better understanding of the antecedent, co-existing and resultant pathological processes rather than from any further refinements in operative procedures.

# GASTRIC ULCER. ETIOLOGY, SYMPTOMATOLOGY AND DIAGNOSIS.

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Clinically the simple ulcer is not so frequent as the statistics of postmortems would lead us to expect, being from .6 per cent., as diagnosed by Lebert, to .82 per cent., as observed by Fenwick. Thus in the extensive records collected by Welch, ulcer cicatrized or open was in about 5 per cent. of persons dying from all causes. Fenwick, from the examination of nearly 48,000 postmortem records, found scars or ulcers in 4.2 per cent. and in 20,000 autopsies of persons dying from various causes, open ulcer in 1.5 per cent. If we take even the lowest percentage as found postmortem, viz., 1.5 per cent., we see that every other case is undiagnosed in life. Clinically and pathologically, gastric ulcer may be classified as acute, acute secondary and chronic. The tendency of the acute ulcer is to heal and not to become chronic. This is evidenced by the fact that while we find the acute ulcer in three women to one man between the ages of twenty and thirty, we find the chronic ulcer in three men to one woman between the ages of thirty and fifty; hence, if the tendency of the acute form was to become chronic, the proportion of three women to one man would remain unchanged.

The disease is very rare before puberty, although Goodhart has reported a case in an infant thirty hours old. More than three-fourths of all ulcers in women occur between the ages of twenty and thirty, while more

than one-half of all the cases in the male subject occur from thirty to fifty. Old age offers no immunity. Many cases of fatal hematemesis or perforation are reported in subjects over seventy. Statistics do not prove that tailors, shoemakers, cooks, etc., are especially prone to the disease. Indoor occupations and secondary habits which tend to induce general ill health; anemia, chlorosis, etc., may aggravate the natural predisposition of young women to acute ulcer. Some 14 per cent. of chronic cases are alcoholic, but there is no evidence to show that alcohol has any effect to produce the acute ulcer. Since Reichmann in 1882 first called attention to hypersecretion which frequently accompanies ulcer, much has been written to establish it as one of the most potent causes which prevent repair. We find it most often in the chronic cases. Reasoning from the above it follows that while hypersecretion and hyperacidity may be causes of the chronicity of an ulcer, the ulcer itself is the cause and not the effect of the hypersecretion. The cases of ulcer as we see them are mostly of the chronic type or suffering from the effects of former ulceration. A possible explanation of this may be that vomiting of blood is a less common symptom than we sometimes think it. The onset of acute ulcer is sudden and the tendency is toward rapid recovery. Many may have pain or vomiting, perhaps both, and soon learn to abstain from food long enough to establish the process of healing. Vomiting of blood is a more serious symptom and probably all such cases come under medical care.

Pain after eating is usually the earliest and most persistent symptom. The pain ordinarily begins within ten to thirty minutes and gradually increases in severity until relieved by emesis, or until the period of stomach digestion is completed. If it occurs immediately upon swallowing food, we have to distinguish between gastric hyperesthesia and ulcer. The pain of hyperesthesia is as

often produced by milk or simply water, as by solid food. It is very rare for the pain of acute ulcer to be relieved by food of any kind, so rare that one must need unmistakable evidence before risking a diagnosis of ulcer. If the ulcer is situated close towards the pylorus it may provoke pyloric spasm and the pain then closely simulates biliary and appendiceal colic. We then have to establish a definite relationship between the taking of food and the oncoming of the pain. The patients may maintain that it is the food which makes the pain and that they have to be careful what they eat; still we may find that with all of their care they do at times have the attack independent of food. These attacks occur at comparatively rare intervals, while the pain of ulcer is a daily affair and ordinarily occurs as many times a day as they eat. The pain of acute ulcer must also be differentiated from the pain of an intestinal neurosis. In this latter trouble the pain is induced reflexly by the taking of food, but is often accompanied by an urgent call to stool, which may be ineffectual or accompanied by a small mucous stool. The pain is referred to the umbilical region and there may be tenderness along the transverse and descending colon, but an absence of the tender point so characteristic of ulcer. Vomiting is less common than in ulcer and when it occurs may follow the taking of liquids as well as solids. Vomiting which is provoked by liquids, coming on soon after swallowing with little or no actual pain, is strongly suggestive of some form of neuroses.

Hematemesis is a sign of such unmistakable value that we only need to exclude a certain few other sources for the blood, to establish a diagnosis by that alone. The age of the patient suffering from acute ulcer ordinarily excludes cirrhosis of the liver and an examination of the back and kidneys will eradicate the most common sources for an increased blood pressure which might produce a venous oozing from the gastric mucosa. The

hemorrhage from ulcer is so sudden and profuse, at first dark blood and clots, later bright blood accompanied by the usual signs of a sudden withdrawal of blood from the circulation. Nothing in the way of hematemesis simulates it in its suddenness and shock except the rupture of an aneurism into the esophagus or stomach. We would have the previous history of difficulty in swallowing, inequality of the radial pulses, etc., in the case of thoracic aneurism, and the hemorrhage would be much more liable to prove fatal than in ulcer. Except in rare instances in which hematemesis is the initial symptom, we would have a previous history of indigestion to establish a diagnosis of ulcer.

Reference has previously been made to the fact that one-half of the cases of gastric ulcer as found postmortem are undiagnosed in life and an explanation offered, viz., that many patients with ulcer unconsciously cure themselves by abstaining from food. This must be true, for we find that gastric perforation is the first symptom in 3 per cent. of all cases of perforation. Perforation is accompanied by the usual signs of shock, by sudden agonizing pain in the upper abdomen, which is distended and is excessively tender; the lower abdomen is retracted and muscles held rigid; the respirations are shallow and rapid in consequence of the shock and abdominal rigidity. An unmistakable evidence of perforation is the sudden obliteration of the liver dullness. A previous history of ulcer will be of aid in confirming this diagnosis. As variously estimated, 4 per cent. of these patients die during the initial shock. Those surviving the shock will follow one of several courses, which in the order of frequency are general peritonitis, local peritonitis with adhesions to surrounding structures, subdiaphragmatic abscess, empyema, etc.

Acute secondary ulcer is of especial clinical interest, accompanying, as it does, other conditions, as pyemia, erysipelas, enteric fever, pneumonia, general tuberculo-

sis, or as a result of direct or indirect traumatism. The secondary form is somewhat less liable to present the usual clinical symptoms, hematemesis being rare, though sudden and fatal hemorrhage, leaving the stomach and bowels filled with blood, is a frequent termination. Even the slightest stomach symptoms in this class of cases would place us on guard and perhaps a disaster be thus avoided. The cause of sudden death has many times been given as heart failure, to be disproved postmortem by finding the stomach filled with blood. The ulcer resulting from the contact of corrosives is the most liable to become chronic.

The symptomatology of chronic ulcer is more or less confused by the conditions which may be coincident with it. Pain is the most uniform symptom and is variously described as burning, gnawing, boring, etc., the last being a pain which goes through to the back to a point to the left of the center and between the eleventh dorsal and first lumbar vertebræ. However described, they all agree that it is a severe pain. It comes on from fifteen to thirty minutes after eating and continues to increase in severity until relieved by vomiting, or until the period of stomach digestion is past. In highly nervous individuals it may even be paroxysmal in character just before meals. It is usually circumscribed between the ensiform and umbilicus, but may radiate around the sides and up into the chest. When the pain is continuous, even after digestion is completed, it is usually aggravated by solid food, but may be relieved by liquids. In such cases the pain is probably due to the action of hyperacid secretions. The pain is produced by either actual contact of solid particles of food with the ulcer, the peristaltic motion of the stomach or by the hyperacid secretions, chief among which is the motion of the stomach wall. Pressure always increases the epigastric pain, while it may be relieved by certain postures, as lying on one side or the other, or upon the back.

Vomiting is a less common symptom. When it occurs typically it comes on from thirty minutes to an hour after eating, when the pain has become severe. In long-standing cases it may be the only symptom, sufficient healing of the ulcer having taken place so that little or no pain is experienced; it will then occur two or three hours after eating and be preceded by a sense of weight in the epigastrium, oppression in the chest, flatulence, etc., and is due to the secondary gastritis induced by the ulcer. The vomiting of pyloric obstruction is purely a mechanical matter and has no connection with the ulcer. Actual hematemesis must certainly be a less common symptom than we are apt to think it. It is probable that in every chronic ulcer there is, at times, bleeding. But the amount is so small that it is not noticed by the patient either in the vomited material or in the stool.

If the ulcer is close in toward the pylorus, the whole of the blood may escape by the bowel. The anemia resulting from the hemorrhage from a chronic ulcer shows less tendency to repair itself than in the acute form, the tendency being to become progressive; sudden and fatal hemorrhage may occur, but it is rare.

A conservative estimate of perforation places it at about 5 per cent. It occurs most frequently in females, which may be accounted for by the fact that many more women suffer from acute ulcer, and that the chronic ulcer developing from the acute is more liable to perforation. The accident may occur suddenly or be preceded by an increase of the pain and vomiting, or by a vomiting of blood. The pain will not only be more severe, but more persistent and less relieved by vomiting, in which case it will be due to local peritonitis. Clinically we may classify chronic gastric ulcer as the gastralgic, catarrhal or vomiting, dyspeptic, hemorrhagic of cachectic form, according to the prominence of individual symptoms. The class of ulcers in which pain is the most prominent feature must be distinguished from

hyperesthesia, hypersecretion, biliary colic, chronic appendicitis and diseases of the spinal cord. The pain of hyperesthesia and nervous gastralgia comes on at once after swallowing, is provoked by liquids as well as solids, and is less relieved by vomiting. The whole epigastrium is tender, but there is no circumscribed tender point. The pain of biliary colic comes on in distinct attacks between which the patient is able to eat without discomfort; pain lasts from a few minutes to a few hours and, as a rule, is unrelieved by vomiting. The strongest point is the indistinctness of the attacks with the relief from stomach symptoms between. The pain of chronic appendicitis may be an everyday affair for weeks and months, like ulcer, but vomiting is more rare and does not relieve. The tender point is in the neighborhood of the appendix. The pain has no relation to the taking of food and there may be a history pointing to a former attack of acute appendicitis.

The pain of spinal cord disease affects the whole upper abdomen, and is independent of food. Vomiting gives no relief and often occurs when the stomach is empty.

The pain of hyperacidity and hypersecretion is not so easy to distinguish from that of ulcer, owing to the frequent co-existence of the two. As a rule, the pain comes later, one or two hours after a meal, and begins as a burning sensation and sense of fullness, then pain in the whole epigastrium, no localized spot, temporarily relieved by hot water, milk or soda, finally eructation of sour fluid. When vomiting occurs it will consist of a large quantity of bile-stained fluid and usually occurs during the fasting hours, as in the night. Examination of the stomach before breakfast shows more or less acid fluid. Hemorrhage never occurs unless complicated by ulcer. A milk diet has no effect to relieve as it would in ulcer.

The dyspeptic form of ulcer must be distinguished from chronic gastritis and nervous dyspepsia. A certain

amount of gastritis is usually present with chronic ulcer and may obscure the diagnosis. The development of the symptoms in gastritis is gradual and uniform, while in ulcer there will be a history of previous hard pain after food extending over a variable length of time, with a period of comparative relief following. In gastritis the discomfort is excited by liquids as well as solids and comes on later, one or two hours after meals; there will be no localized tender point, there will be abdominal distension and eructation of gas and perhaps vomiting of stringy mucus in the early morning, independent of food. In gastritis the tongue will be foul, appetite impaired and bowels irregular; while in ulcer the tongue is clear and red, appetite good and bowels very constipated. A milk diet usually increases the epigastric distress and vomiting of gastritis.

The pain of nervous dyspepsia is more a sense of emptiness and depression in the epigastrium coming on at once after eating, or during the interval of digestion. Actual vomiting is rare; even when vomiting seems profuse there is little or no loss of flesh and there will be an absence of a circumscribed tender point.

The hemorrhage from hepatic cirrhosis is more an oozing of very dark blood, seldom profuse, and is accompanied by much retching, especially in the early morning, loss of appetite and flatulence. There may be ascites and, as a rule, an enlarged liver.

What has previously been said of thoracic aneurism will apply equally well here. The cachetic form of ulcer must be distinguished from cancer and pernicious anemia. The strongest point in distinguishing cancer from ulcer is the comparative rapidity of the oncoming of the disease. Even when cancer develops at the site of a former ulceration the rapidity of the oncoming of the disease, rapidity of loss of flesh, appetite, etc., is very marked. The pain of cancer is more constant, less influenced by food and not relieved by vomiting. Pro-

fuse hemorrhage is rare, but small amounts of dark blood in the rejected material is common. The pressure of tumor will practically confirm the diagnosis, though in certain rare conditions we may have a tumor with ulcer.

In pernicious anemia the shortness of breath, loss of color, etc., usually precede the digestive symptoms. Pain is seldom present after food, but rather distension and flatulence, with water-brash and occasional vomiting. There will be an elevation of body temperature which is absent in uncomplicated ulcer. The blood examination will often be of great aid in clearing up a diagnosis, if there be any uncertainty.

# PERFORATING GASTRIC ULCER.

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The medical profession of this country has been rapidly awakening to the fact that gastric ulcer is comparatively a common disorder. That although medical treatment was followed by an apparent cure in a majority of cases, in many instances even the rest and starvation cures were insufficient, and many of the cured cases relapsed to become chronic invalids if they were not relieved by surgical measures.

Dr. Will Mayo has done more than any one else in this country to impress upon us the frequency of gastric ulcer and the necessity of performing some operation to overcome the deformities of the stomach which follow, or to cure the ulcer itself.

Perforation results from the extension of either an acute or a chronic ulcer and has been looked upon as a very rare occurrence. Extra-uterine gestation was supposed to be a surgical curiosity, but when Tait with his lucid description opened our eyes, we commenced to see them with great regularity. My own belief is that perforating gastric ulcer is fully as common as an extra-uterine gestation, and that when our eyes are opened to this fact we will be able to see them, diagnose them early and save many lives that are now lost. The English journals of the past two years contain many records of perforating gastric ulcers. It would seem as though, through the influence of Mr. Mayo Robson, the English

physician is better able to diagnose these cases than his American brother.

In this country I do not believe that perforation cases reach the hospitals as often as they do abroad. For instance, such cases as the ones described by Crisp and Fenwick, where a young girl, who had never given any marked gastric symptoms, suddenly screams, falls to the floor, soon becomes unconscious and dies in a few hours. In two such cases perforative gastric ulcer was found as the cause of death at the postmortem. No wonder such cases have never been understood. In proof of my conclusions that these cases do not reach the hospitals, Mayo reports 313 operations on the stomach and the first portion of the duodenum with only five perforations. Greenough and Joslin, in their study of 187 consecutive cases of gastric ulcer seen at the Massachusetts General Hospital between the years of 1888 and 1898, report there were only six perforations, all of which died. On the other side Mr. Mansell Moullin reports that between the years 1897 and May, 1902, there were admitted to the London Hospital 500 gastric ulcers; of this number 48, or 10 per cent., died from peritonitis and perforation.

Lebert found acute general peritonitis with perforation in 12 per cent. of his own cases, and in 37 per cent. of the fatal cases which he was able to collect from the literature. Dr. Samuel Fenwick, consulting physician to the London Hospital, found that in 678 autopsies with open gastric ulcer up to 1900, perforation had occurred in 153 cases, or 23 per cent. Mr. Moynihan, in the *London Lancet* of January, 1903, reports 51 perforating duodenal ulcers, most of them from the literature, and many of them in which a mistaken diagnosis of appendicitis had been made. Moynihan's divisions of peptic ulcers seems particularly good. He divides perforative ulcers of the stomach and duodenum into acute, subacute and chronic. In the acute form the opening is large and a considerable amount of stomach contents are suddenly emptied into the peritoneal cav-

ity. In the subacute the stomach is empty or the opening is small and consequently the peritoneum is slightly soiled. In the chronic form the opening is walled off by adhesions.

All authorities agree that whereas gastric ulcers are more common on the posterior wall, acute perforations are usually on the anterior surface. The posterior ulcers are more frequently chronic in their methods of perforation, leading to the formation of subphrenic abscess. The premonitory symptoms of perforating ulcer are usually well marked. There are the ordinary symptoms of gastric ulcer, local tenderness, and pain after eating, in a spot just below and a little to the left of the ensiform cartilage, or in a corresponding point in the back; belching of gas, sometimes hematemesis or melena, some or all of these symptoms existing for a few days or for several months. In a certain considerable proportion of cases, however, all premonitory symptoms are lacking, and this is often true in the most acute perforations with either acute or chronic ulcers, especially if the ulcer is well up on the anterior surface near the lesser curvature, the so-called latent gastric ulcer of Robson.

The immediate symptoms of acute perforation are, first, sudden, agonizing, overwhelming pain in the region of the stomach, something tearing in character, often with the sensation of something having given away. This pain is frequently so intolerable that the patient falls to the ground and even may become unconscious, as in the cases described above. The pain rapidly spreads, following the gastric contents to other parts of the peritoneal cavity. If the perforation be near the pylorus or in the duodenum the stomach contents flow over the hillock of the right transverse mesocolon into the right kidney pouch, and from there into the right iliac fossa, which accounts for the fact that many of these cases are diagnosed as appendicitis. Rigidity and tenderness of the abdomen soon follow, together with profound col-

lapse. The absence of liver dullness is a symptom upon which some authors place considerable reliance, but if the stomach does not contain considerable gas at the time of the perforation the liver dullness will not be changed.

My experience leads me to believe that Dr. Richard Harte of Philadelphia is correct when he says that rigidity or tension of the abdominal muscles is the key-note to the early recognition of peritoneal perforation from whatever source. The pain may subside, the temperature may not be elevated, but the rigidity continues even up to the end. Vomiting is seldom present with perforation, wherein these cases differ from acute peritonitis, from other causes; the prostration and collapse are well marked, the pulse is weak at first and frequently becomes dicrotic and small, and the other symptoms are the well-known evidences of a very acute general peritonitis. The symptoms of subacute or chronic perforations are naturally not so well marked. But in the main they are the same as in acute cases, only milder and slower to develop. Often they will simply be the symptoms of a local peritonitis or of an intraperitoneal abscess located near the stomach. In making a diagnosis of perforating ulcer we should, first, carefully distinguish between commencing inflammations above the diaphragm and any disorder below. We must remember that occasionally an acute pleurisy or pneumonia may in some degree resemble a perforation in the upper abdomen. As between the different intraperitoneal inflammations or accidents which may be mistaken for perforation, the differential diagnosis is not so important and is perhaps frequently impossible. Lund and Fitz of Boston believe that the differential diagnosis is not possible between this condition and an acute pancreatitis or perforation of the biliary passages.

Mr. C. B. Kietley says that certainty of diagnosis in most cases of gastric perforation is impossible even with experienced persons, but that "it is not necessary," and

he further says, any physician who, in the face of such symptoms as these which I have already described, wastes valuable time in the attempt to make an accurate diagnosis, is almost criminally responsible for the death which is sure to follow. For example, Mr. Bidwell recently collected fifty-five cases of perforating ulcer; in this list most of the cases operated upon in the first twenty-four hours recovered; after that time the great majority of the cases died. Personally I believe that many of these cases can be correctly diagnosed, as is proved by a few cases which I here report, and the many cases which are constantly being published in the journals. If we will only rid our minds of the old legend that these cases are rare, and will appreciate that they are not uncommon, we will not miss them so frequently.

What is the duty of the medical man when he meets such a case? My answer would be to first give the patient morphia—that will be necessary on account of the terrible pain which these patients suffer during the first few hours—and then without delay have him transported to the nearest hospital, lying in a wagon or on a cot in the baggage car, or in an ambulance, if one is to be had. This should be done because these patients have a much better chance of recovery in a hospital, despite the transportation, than they do if operated on in a private house.

The secret of success in treatment of acute perforations is an operation at the earliest possible moment, followed by suture of the opening with silk or linen or calking the opening with gauze. Sponging, if the peritoneum is slightly soiled, without drainage, but if a considerable amount of fluid is found in the peritoneal cavity a large-sized drain should be put into the pelvis through a stab wound over the symphysis and the patient be put to bed in the Fowler position.

CASE 1. *Perforating Latent Gastric Ulcer on the Anterior Wall; Operation Eleven Hours After Perforation; Recovery.*—F. M., age 30 years. Six years ago he

had what was supposed to be tuberculosis, followed by some slight hemorrhages and faint spells, referred to the stomach, which was relieved by eating something or taking a teaspoonful of whiskey. These symptoms lasted for about one year, when he entirely recovered. For the past four days he had suffered from some slight gastric distress and was dieting himself. He was working on his farm in Southern Minnesota at 10 a. m. on June 3d, when he was suddenly seized with such a severe pain over the stomach that he fell to the ground. One hour later he was seen by Dr. Frazer of Lyle, who made a diagnosis of "some serious intraperitoneal accident." He immediately put this young man on a cot and got him onto a train which was just leaving for St. Paul. I first saw him at 8:30 p. m. and made a guarded diagnosis of perforative ulcer of the stomach, on account of the history and the large quantity of fluid which had evidently been passed into the peritoneal cavity. Still, as the pain was most intense in the pelvis when I saw him, I made an exploratory opening over the appendix for drainage. When I found that the appendix was normal and that the abdominal cavity was filled with a thin, turbid, watery fluid, I immediately made a stab wound over the symphysis and put in a large-sized aluminum tube, also tube and gauze in the McBurney X-muscle incision. I then made an opening over the stomach and found without any difficulty a perforation on the anterior wall nearer the lesser curvature and two inches from the pylorus, the opening being about the size of a pea, with slightly thickened edges. The opening was easily and quickly closed with a silk purse-string suture. One end of a small gauze strip was folded down over the opening and caught with a catgut stitch. The patient was put to bed in the Fowler position, sitting almost completely upright, tied to a bed-rest. He kept this position from choice for several days, finding that he was more comfortable while sitting upright than he was when lying down. All the drains were removed

on the fourth day and he made a prompt and rapid recovery. He reached home in less than a month and has remained perfectly well, attending to his business as a farmer and banker for the past six months. Dr. Frazer writes me that our patient is in the best of health, can eat anything, but that he has the worst breath that he has ever come in contact with.

CASE 2. *Probable Perforating Gastric Ulcer; Death in Twenty-nine Hours Without Operation or Postmortem.*—While Case 1 was still in the hospital Dr. Cameron, the house surgeon, went to Rush City for a few days to help Dr. Stowe of that place. Together they saw Miss M., who had been a constant sufferer from anemia, with attacks of indigestion off and on for a year and a half. This young woman was out working in the garden when at 11 a. m. she was suddenly seized with the most acute and agonizing pain over the stomach and became collapsed. Dr. Stowe saw her two hours after the accident and gave her morphia for her pain, but was not able to make a diagnosis, but suspected ruptured extra-uterine gestation. The next morning Dr. Stowe and Dr. Cameron saw this woman together; she had a rapid, weak pulse; was suffering great pain and dyspnea. Her abdomen was hard and rigid, especially in the upper portion, while the lower abdomen evidently contained fluid in considerable quantity. I was called to see her, but did not reach Rush City until just as she died, at 4 p. m. It was not possible to get a postmortem examination in this case, so that the absolute diagnosis is impossible. Her history is very suggestive to me.

CASE 3. *Subacute Perforating Gastric Ulcer; Operation Nine Hours After Perforation; Recovery.*—E. H. This young man was 27 years of age, had never suffered from any severe illness, but for the past two years he had some indefinite stomach distress. For the past ten days he had suffered from a more pronounced pain in the stomach, but not enough to cause him to consult a phy-

sician or to stop work. His pain was fairly constant, being relieved for a couple of hours after eating. His appetite was poor and he was afraid to eat much but liquids. At 11:30 a. m. on Sept. 2, 1903, while working at a bench, he suddenly had the most intense pain over his stomach and dropped to the floor. My partner, Dr. H. P. Ritchie, who had assisted me with Case 1, was called to see him. He made the absolute diagnosis. Dr. Rothrock of St. Paul was their regular physician, so he was called upon to operate upon this case. He found a chronic ulcer on the anterior wall of the stomach one inch from the pylorus, in the cavity of which was a minute perforation about the size of a pin's head, exuding mucus and gas. The opening was closed, the peritoneum sponged and closed with a cigarette drain, and the patient promptly recovered.

Here are two proved cases occurring in the practice of Dr. Ritchie and myself in three months, with one probable case during the same length of time, which makes me feel that perforative gastric ulcer is not a very uncommon disease; and that probably other cases of acute peritonitis which I have seen in the past were due to this same cause. My previous experience with perforating gastric ulcer is confined to two cases; one operated upon ten years ago for what was supposed to be a perforative appendicitis, on the third day. A large abscess in the pelvis was opened and drained. The man lived thirty-six hours. The postmortem examination revealed an opening as large as a silver quarter, well up on the anterior surface of the stomach, with thickened edges.

The second case, June, 1901, immediately following a supravaginal amputation of the uterus for an old suppurative disease of both appendages. In this case I had introduced the gloved hand and explored the upper abdominal cavity without being able to make out any diseased condition. The operation was immediately followed by an acute peritonitis, which was supposed to be

due to the hysterectomy. At the postmortem we found a chronic ulcer low down on the posterior wall of the stomach with an opening which would just admit the tip of the little finger.

## DISCUSSION

### ON THE PAPERS OF DRS. NILES, DAVIS AND MACLAREN.

DR. CHARLES W. OVIATT, Oshkosh, Wis.—I would like to put on record the report of a case in which there were absolutely no symptoms. The patient was a man, 62 years of age, who worked as a day laborer on the streets, and would have been at work on this day if he had had any work to do. He did not complain of any symptoms. There was no hemorrhage, no vomiting. No one knew he was sick. On this day he ate a hearty dinner, and as he did not have to go to work, he laid down on his couch to take a rest. Within an hour he rolled over on to the floor in agony. He did not vomit, but complained of terrible pain. He said to his wife: "My stomach is busted." A physician was called, who gave large doses of morphin hypodermically. These did no good. He died within a few hours. I was present at the postmortem examination. A perforating ulcer was found in the posterior wall of the stomach which seemingly had attempted to heal. There was no blood in his stomach. The abdominal cavity was filled with stomach contents. Undoubtedly this ulcer had existed for several weeks. There was a thin, parchment-like membrane of peritoneum only. The inner edges of the ulcer had been rounded off; the ragged perforation took place suddenly, but there were no symptoms caused by it before death.

I would like to ask Dr. Niles in closing the discussion whether he recommends anterior or posterior gastro-enterostomy in these cases.

DR. B. B. DAVIS, Omaha, Neb.—The last paper in the symposium (Dr. MacLaren's) interested me very much, especially the recommendation for operation as soon as possible after the onset of the acute symptoms.

There is one question that comes up which I wish the essayist would devote some attention to in his closing remarks, namely, as to whether he would wait a little for the acute shock to pass away. My own idea is not to wait for anything; that the administration of the

anesthetic will do more to relieve shock than anything else. I was wondering whether the views of the essayist were the same.

Let me say a word or two now with reference to the first and second papers, in regard to the etiology of gastric ulcer. I confess that I can not fully agree with the writers of these papers in regard to the etiology. I admit that occasionally cases of gastric ulcer occur from some form of trauma; but that stagnation accounts for most cases of gastric ulcer, and without stagnation there can be no ulcer. This stagnation may be due to a variety of causes. Dr. Niles took the position that adhesions about the stomach produced it. Undoubtedly this explanation is a good one for a small percentage of the cases, but I do not believe it accounts for a large number of them. My idea has been that a great many of these cases are due to the following conditions: A patient has been inclined to eat imprudently; perhaps he has eaten more than he should, or the use of alcoholics may enter into the case. As a result of this, there has been irritation of the mucosa of the stomach. Following this there is more or less spasm of the pylorus; the stomach does not empty itself; the result is that each time the stomach is filled it takes a longer time to empty, there is still more irritation of the mucosa until we have hyperacidity, etc., and in the course of time the condition of the mucosa becomes so bad that it is only natural for the process of ulceration to occur. When ulceration occurs it helps to establish a vicious circle, and keep up stagnation more than it was before by greater spasm of the pylorus. In the great majority of cases this seems to me a plausible explanation.

Dr. Leonard Freeman, Denver, Colo.—I desire to call attention to the fact that rigidity of the abdominal muscles in these cases is not always found at once. In a case which I saw some time ago perforation occurred early in the morning, and rigidity of the muscles did not occur until the afternoon at about 2 o'clock. This led to the non-recognition of the case, and although an operation was done, it was too late to be of any service to the patient. At the autopsy a perforation was found the size of a lead pencil in the posterior portion of the duodenum, and the abdominal cavity filled with stomach contents.

Dr. H. A. Sifton, Milwaukee, Wis.—It has been my

privilege to make postmortem notes of five cases of gastric ulcer and one of duodenal ulcer. Three of these cases were attended by the coroner. The symptoms in them were such as to lead to the suspicion of poisoning. No diagnosis whatever had been made until a postmortem examination was had. Some of them had called physicians, who had seen the patients for two or three days, but the symptoms were so obscure as not to enable them to make a diagnosis.

I have had but two cases of gastric ulcer on which I have operated, both in my own practice; the diagnosis was made within twelve hours. One died, one recovered.

In reference to Dr. Niles' paper and his suggestion that the stitch alone is all that is necessary in performing anastomosis, after examining all forms of mechanical contrivances, and they are numerous and ingenious, that have been invented as aids in these cases, I fully agree with him that the stitch and the stitch alone is all that is necessary, and the use of any of these mechanical appliances will quickly teach us that they are wholly unnecessary. With a little experience the operation can be done just as well with the suture as with any form of mechanical appliance.

Dr. Charles H. Mayo, Rochester, Minn.—I wish to say a few words in reference to the etiology of gastric ulcer. We have examined 1,500 stomachs by test meals, laboratory testing and physical examination, and as far as we can judge the principal etiological factors are anemia and hyperacidity.

Friedler, after examining 2,200 stomachs at autopsies, found that 20 per cent. of the women and only 11 per cent. of the men had shown signs of ulcer of the stomach. Welch, after examining 800 cases of ulcer of the stomach, found 60 per cent. in women and 40 per cent. in men. In our own experience, after operating on something over four hundred cases of the 1,500 stomachs we examined, the proportion was about the same as that given by Welch. Of 788 ulcers of the stomach examined by Welch, he found that only 28 per cent. occurred in the greater curvature, so that the bulk of these ulcers are usually situated in the pyloric end of the stomach. In over 70 per cent. of our cases of cancer of the stomach we elicited a history of chronic ulcer ranging from one to fifteen years, so that the pylorus can be looked upon as the grindstone, and the stomach grinding food against

its end is the occasion for a greater number of cases occurring in this region. Our statistics will show 88 per cent. of gastric ulcers and about 12 per cent. of duodenal ulcers. The tendency is more and more to class the first two and one-half inches of the duodenum as a part of the stomach. In thirty-one cases of acute perforation of the stomach and duodenum, eleven occurred in the duodenum (in this first two and a half inches of the duodenum), and in twenty-six chronic cases on which we have operated the ulcer was in the duodenum.

The perforation of any viscus gives, as a rule, almost the same symptoms; no matter where it occurs, nor in what organ it may be in the abdomen, we can approximately locate the lesion in the upper or lower half of the abdomen. There are a few rare cases of lax abdomen, with perforation, so accurately described by Dr. MacLaren, accompanied by acute shock. We get conditions of shock in the upper abdomen from perforated gall bladder, perforated duodenum, perforated stomach, and especially from acute hemorrhagic pancreatitis, so that it is not necessary to diagnose the exact condition but to determine whether the case is surgical or not. If in these cases we find in the upper abdomen such symptoms as Dr. MacLaren has described, with bloody serum, there is no necessity of doing anything more than to drain them. If we operate on a case of acute hemorrhagic pancreatitis within twenty-four hours, we are not likely to find fat necrosis; but we will find bloody serum, and these cases are notoriously bad for operation, and the quicker we can get into the abdomen and get out with drainage the better it is for the patient.

Dr. M. L. Harris, Chicago, Ill.—There are two points I wish to bring out in connection with this symposium on gastric ulcer, and one is the etiology. The extensive experimental work of Dr. Fütterer showed it was impossible to produce an ulcer in the stomach of an animal until the hemoglobin of the blood had been reduced below a certain point; that all lesions of the mucosa produced in healthy animals readily healed. When the hemoglobin was reduced below a certain point, in other words, causing a marked degree of anemia, or chlorosis, then these lesions developed into typical ulcers. This experimental work shows the importance of an examination of the blood in these cases.

The other point is the importance of examining the feces for hematin crystals as a means of diagnosis in obscure cases. They can be detected in the feces by microscopical and chemical examination. All cases of ulceration of the stomach will show the hematin crystals in the feces, if a proper examination is made, and it is a most important diagnostic point in otherwise obscure cases.

DR. NILES (closing the discussion on his part)—I will only take time to refer to one or two points. The etiology is one point I ventured to bring before the Association. The points I brought out in connection with the etiology are comparatively new, taken as a whole, and I am quite sure the majority still believe that the condition of the blood has more to do with the cause of gastric ulcer than any local cause. But it must be noted that with the same blood conditions existing, we have 80 per cent. of stomach ulcers against 12 per cent. of duodenal. I can not see how we can evade the conclusion that there must be some local condition which gives the stomach 68 per cent. more. If there is a local condition, and we search for it, we find not only the gastric juice helps us to account for it, but we find the usual cause of ulcer, which is a communication between the stomach and any other inflammatory condition within the abdomen, as appendicitis, or any infection within the abdomen. One of the speakers misinterpreted what I said with reference to peritoneal adhesions. Almost invariably we find, if we look for the cause of ulcer in other parts of the body, that it is necessary for us to investigate as to whether the ulcer is connected with any other infection, or whether it was in a position where it would be most likely to receive an embolus. I am quite sure it is not the sole cause, but I believe it has to do with the causes. The statistics showed 80 per cent. of stomach ulcers, 12 per cent. duodenal and 60 per cent. due to local causes. The experiments mentioned would seem rather conclusive at first sight. It is known already that when the irritation of gastric ulcer is removed, healing occurs spontaneously, and that is the basis of all our surgical treatment, that these ulcers will heal spontaneously. When there is no irritation of the mucosa temporarily, and no diminished amount of hemoglobin exists, the ulcer will heal, but with an exciting cause, like the presence of emboli, or dragging upon the stomach, we have a permanent cause,

which, if removed, would in many instances bring about recovery, but not at the pylorus, whether it is open or cicatrized.

DR. DAVIS (closing the discussion on his part)—I would emphasize the point made by Dr. Charles Mayo in regard to the etiology, that gastric ulcer is largely secondary to anemia or to blood changes, rather than the primary cause. In my paper I spoke of the great number of cases of gastric ulcer in women, and also showed by statistics that gastric ulcer does not occur more frequently in tailors and cooks and people who lead sedentary lives than in others. Statistics did not prove, furthermore, that it was more common in alcoholic patients. Therefore, the general consensus of opinion is that gastric ulcer is very largely due to blood changes.

DR. MACLAREN (closing the discussion)—I agree with Dr. Niles that a certain element of importance should be attached to other infections in the abdominal cavity. Of the cases of chronic gastric ulcer I now recall, most of them have been associated with old inflammatory conditions below, with omental adhesions. Dr. Niles also referred to the method of treatment of hemorrhage from gastric ulcer, saying that the mortality of gastric hemorrhage is only 4 per cent., and that the results from excision were bad. The next few years will probably prove that gastro-jejunostomy is not certain, because a number of cases are already on record where acute hemorrhages have not been relieved by this method. A good many cases have been reported of cures following excision of the ulcer; many other patients have died as the result of excision.

The cases reported by Drs. Oviatt and Sifton were interesting instances of perforation and gastric hemorrhage. Unfortunately, in this country we do not get and make as many postmortem examinations as they do abroad, and on this account we can not know in many instances the cause of death. We say a patient died from heart failure, or from idiopathic general peritonitis. But really we do not know. Postmortem examinations can only clear up the cause or causes of death.

I was a little surprised to hear what Dr. Freeman had to say about rigidity. I have never heard of a case in which there was no rigidity at any time during the progress of the disease, and the men who are generally writing on it lay great stress on this diagnostic point.

# THE TREATMENT OF HEMATEMESIS BY GASTRO-ENTEROSTOMY, WITH REPORT OF CASE.

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The necessity of an operation and the most propitious time for performing it having been decided upon, the next question will be regarding the manner or the method of operating. This will be found to vary considerably, depending entirely upon the character of the conditions found. Two lines of operative treatment are available, the direct and the indirect. The direct includes the theoretically ideal methods, and others less ideal, but still acting primarily upon the source of the hemorrhage. The indirect methods are those operative procedures that exert a healing or hemostatic influence in some manner not involving the ulcer itself. These two methods may be classified as follows:

**Operative treatment of gastric hemorrhage.**

- **A—Direct...**
  1. Excision of ulcer.
  2. Partial gastrectomy or pylorectomy.
  3. Ligation of the principal artery.
  4. Cauterization or curettage of ulcer.
  5. Ligation of mucous membrane.
  6. Ligation of all coats.
- **B Indirect...**
  1. Gastro-enterostomy.
  2. Pyloroplasty.
  3. Gastrotomy.

In considering Class A as a whole, it will be found that there are many reasons why these methods are impracticable, and many times can not be carried out. These objectionable points are such as the difficulty of locating the ulcer; the source of a hemorrhage sufficient to cause death may easily escape detection; the fact that

in about 20 per cent. of the cases the lesion is multiple; the presence of firm and vascular adhesions, sometimes to adjacent and important organs, such as the pancreas; likewise the indistinct limitations of the pathological tissues; all of which have tended toward making impracticable the direct methods of attack of the bleeding point. As to the choice of these methods, it would seem to lie between ligature of all coats, as recommended by Andrews, partial gastrectomy or excision of the ulcer, if the last two are practicable.

The high mortality rate of some and the impracticability or the unreliability of the others have been the cause of a general turning to the indirect methods, especially to that apparently all-healing operation of gastro-enterostomy. The exact manner in which a gastro-enterostomy usually causes a healing of the ulcer is a question more or less debatable. But the explanation usually accepted is, in effect, as follows: The anastomotic opening allows of a comparatively perfect drainage, the stomach is rapidly emptied, is therefore given rest and quiet, the hyperchlorhydria is diminished, and as the opening is at the most dependent portion of the stomach, and to the left of the ulcer-bearing area, the ulcer is not irritated by prolonged contact with the stomach contents.

It has also been claimed that the admittance of the small amount of bile and pancreatic juice that find their way into the stomach exert a beneficial influence upon the ulcer. In certain cases, where the gastro-intestinal opening becomes closed, because of the improved and more patent condition of the pylorus, the symptoms of gastric ulcer and even hemorrhage have been known to return. As to whether this is due to the formation of new ulcers or to a revival of the old it can not be definitely stated.

As to the stopping of gastric hemorrhage by the performance of a gastro-enterostomy, such substantial reasons as those stated above for the healing of the ulcer

can not be presented. The chief reason for expecting hemorrhage to cease after the operation will be on account of the rest given to the stomach by the new opening, so, to a large extent, doing away with peristalsis, and at the same time allowing the organ to contract; also the lack of irritation of the bleeding point by the stomach contents. These conditions and others do, without doubt, favor the stopping of hemorrhage and the formation of a clot. That there are cases in which these measures are not sufficient to arrest the hemorrhage can not be doubted. It would certainly seem unreasonable to expect such roundabout and indirect measures to stop a profuse hemorrhage in instances where a large artery has been opened laterally, as in the case reported with this contribution to the subject.

In cases where the bleeding was found to be due to a parenchymatous oozing, the operation has been known to fail to arrest the hemorrhage. It would seem that, as a method of stopping hemorrhage from a large artery, it can not be relied upon, and in cases in which the bleeding comes from the smaller capillaries, it is practically, but not always, sufficient. The amount of the hematemesis will be found to be no criterion as to the size of the bleeding vessel; in cases that have rapidly terminated fatally the bleeding point has been so small as to escape detection at autopsy, even in the hands of the most expert.

On the other hand, cases in which the bleeding vessel has been found to be of such caliber as the splenic artery, life has persisted for weeks after the beginning of the hemorrhage. Therefore, as we are not able to determine with any reasonable sense of accuracy as to the nature of the source of the hemorrhage, it would seem that a gastro-enterostomy was indicated only after a thorough search for the bleeding point. The exact status of gastro-enterostomy as a hemostatic measure in gastric hemorrhage is not definite, as may be very forcibly brought

out by the following quotations from Moynihan and from Robson.

Moynihan says: "Surgical intervention is rarely needed in cases of hemorrhage from acute gastric or duodenal ulcer. When it is called for, gastro-enterostomy, speedily performed, is the surest means of arresting the hemorrhage. A search for the bleeding point is futile, harmful and unnecessary. Search for and local treatment of the ulcer or the ulcers is not necessary. A gastro-enterostomy will, without doubt, prevent recurrence of the hemorrhage and lead to a rapid healing of the ulcer from which the blood has come."

Robson says: "If no ulcer be found anywhere, and the bleeding proves to be capillary, or from small undiscoverable ulcers, gastro-enterostomy should be performed, but if an ulcer be discovered and it be possible to excise it, that operation should be done, as it undoubtedly offers the likeliest method of cure." And again, in speaking of an acute case, he says: "Case 5 illustrates the feasibility of exploring the stomach, even in a patient brought very low by excessive loss of blood, and although the ligature of the chief bleeding point was effected, it was deemed advisable to secure rest for the stomach by performing a posterior gastro-enterostomy, especially as it could be done without materially prolonging the operation."

The ideas expressed in the first quotation, that a search for the bleeding point is futile, harmful and unnecessary, because a gastro-enterostomy will, without doubt, prevent recurrence of the hemorrhage, has apparently been gaining headway. But that the assertions are hardly in accordance with the facts can be seen from Case 5 of Robson's series, and many others in the literature.

To emphasize the conflicting opinions we quote the following extracts:

Moullin: "In every case in which it is practicable I

am strongly in favor of dealing with the ulcer directly in preference to performing a gastro-jejunostomy."

Buck: "An operation for acute hematemesis, whether from an acute or chronic ulcer, seems to me to be an emergency operation, in which one would not feel satisfied unless one performed that for which the operation was undertaken and secured the bleeding point."

Butlin: "The best plan is to open the stomach, and if the bleeding point can not be found, then to do gastro-enterostomy. But to operate on the bleeding point is the best surgery."

That gastro-enterostomy does not, without doubt, prevent recurrence of the hemorrhage, will be proved by the case reported in this article and by others collected from the literature. The cases are in brief as follows:

Kocher says: "That these methods (pyloroplasty and gastro-enterostomy) lead to healing has been proved. But not always. I have seen, after an uneventful recovery of a gastro-enterostomy, a hemorrhage from an ulcer lead rapidly to death."

Peterson reports a case of "gastro-enterostomy performed for hemorrhage. Ten weeks after this operation the patient died from hemorrhage from the stomach, which very likely came, not from an ulcer, but from the parenchyma."

Korte mentions one case (out of 17 operated on while the ulcer was "open") in which the hemorrhage continued after the performance of a gastro-enterostomy. According to A. T. Cabot, "Korte reports two fatal cases of hemorrhage from ulcers eight and twelve days after gastro-enterostomy."

From a careful search of Korte's contributions to the subject in different publications, we have been unable to find the second case, but did find a case of operation for hemorrhage in which gastrotomy was performed, and the ulcer, near the lesser curvature, cauterized with the Paquelin cautery. Death in this instance occurred on the eighth day from a recurrence of the hemorrhage.

A. W. Morton reports a case of acute hematemesis; at operation no evidence of ulcer was found by an examination of the external surface of the stomach, therefore he did an anterior gastro-enterostomy. Death occurred on the second day. At autopsy there was found to be no peritonitis, button well taken, considerable blood in stomach and bowels. Two large ulcers on the posterior wall of the stomach.

Robson cites a case which possibly had better be differentiated from the others, because it was thought to be one of carcinoma; but as the differentiation of ulcer from carcinoma in this class of cases is at times most difficult, and as it is interesting in showing the influence, or lack of influence, of gastro-enterostomy upon hematemesis of a possible carcinomatous origin, a brief synopsis of the case is here appended:

Woman, 42 years of age, gave a history of five attacks of severe and alarming hematemesis. At operation, found a tumor of the pylorus with so many enlarged glands that, had it been malignant, its removal would have been useless, in consequence a gastro-enterostomy was done. Recovery from the operation was uneventful, but at the end of a month, while sitting up, husband reading to her, she suddenly collapsed and died within a quarter of an hour. Profuse hemorrhage was evidently the cause of death. Blood oozed from the anus. No autopsy. It was thought that the carcinoma or the ulcer invaded either the portal vein or the vena cava.

The author's case is in brief as follows:

*Acute Non-symptomatic Repeated Hematemesis.*—With the exception of an attack of typhoid fever one year ago, previous and personal history is negative. On June 9, while in apparent health, vomited about two pints of bright red blood. On the 10th, at about the same time of the day, had a similar attack of hematemesis. On the 12th two hemorrhages occurred, of about a pint each, one in the morning and one in the evening. On the morning of the 13th another hemorrhage took place.

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As medical treatment seemed to be of no avail, and as it was feared that another hemorrhage might prove fatal, it was decided to operate. An examination of the external surface of the stomach gave no clew as to the location nor the character of the bleeding point. As a hasty examination of the mucosa failed to reveal the point, an anterior gastro-enterostomy was performed. Patient did nicely for two days and then became weaker; no vomiting, but blood passed from the bowel. Death occurred on the morning of the fifth day. Autopsy revealed the site of the anastomosis intact and water tight, no peritonitis; the stomach and bowel contained considerable blood. After removing and opening the stomach, a typical round ulcer ½ by ¼ inch in dimension was found on the anterior wall, near the pylorus and the lesser curvature. Microscopic examination showed an eroded artery at the base of the ulcer.

These cases tend to show that gastro-enterostomy is but an indirect and unreliable method of dealing with bleeding from the stomach, and while it has in many cases been followed by a cessation of the hemorrhage and eventually a healing of the ulcer, it can not be relied upon, with any sense of security, to stop the hemorrhage in all cases.

Moullin, in speaking of this operation in this connection, says: "It is at best only a way of evading difficulties which are better met directly before they have attained dimensions which render this impracticable."

This statement will be found to be well fortified by Joslin's discussion of a recent article of Munro's, in which he relates five cases of gastric surgery as follows:

1. Hemorrhage, gastro-enterostomy, recovery from operation, death twenty months later from cancer, which probably existed at the time of the operation.

2. Hemorrhage and dilatation, gastro-enterostomy, with entero-enterostomy; death with circular vomiting sixteen days after operation.

3. Hemorrhage and dilatation, gastro-enterostomy, entero-enterostomy, death within thirty-six hours.

4. Hemorrhage and dilatation, excision of ulcer. Recovery; well two years after operation.

5. Hemorrhage and dilatation, gastro-enterostomy. Recovery from operation, death one month after, due to colloid cancer.

The fact that in this series of four gastro-enterostomies, two should recover from the operation to subsequently succumb to carcinoma, should at least impress upon us the advisability of a more thorough search, and if practicable an attempt to prevent such a sequel.

In attempting to outline the indications for the operation of gastro-enterostomy, in hematemesis, it may be stated that after a thorough, faithful and judicious search fails to reveal the source of the hemorrhage, or if it is found that the conditions will not allow of one of the direct methods to be employed, then gastro-enterostomy may be performed. This thorough search will add but little to the severity of the operation, as this examination of the internal aspect of the stomach can be made through the opening which is to be used in the gastro-enterostomy, if it is located at the lower portion of the greater curvature. The question as to the advisability of supplementing one of the direct methods by a gastro-enterostomy is not as yet settled. The object of this additional step is to place the stomach at rest, and in this way favor the healing of the wound made by the direct interference. Also to act as a prophylactic measure and to remove what is thought to be a cause of ulcer, hyperacidity and imperfect drainage of the stomach contents. Where there is marked dilatation and other symptoms of ulcer with the hemorrhage, such an additional operation will usually be employed if, in the operator's opinion, the condition of the patient will warrant it. The performance of a gastro-enterostomy after radical treatment of the bleeding point will not add materially to the operation, as the anastomosis may be

made at the opening of the stomach, which was used for the exploration.

But on the other hand, the routine addition of gastro-enterostomy to direct treatment will undoubtedly increase the time, extent and severity of the operation, to a greater or less extent. The so-called "vicious circle," while markedly diminishing in frequency, is still occasionally encountered even by those operators who place the opening at the most dependent portion of the stomach. Ulcer of the duodenum, perforating or giving rise to hemorrhage following gastro-enterostomy, has occurred so frequently as to make it appear possible that such an accident might be more than a mere coincidence and that gastro-enterostomy may be found to act as a causative factor has been suggested, and the question is being investigated. Peptic ulcer of the jejunum has also been described as a result of the abnormal condition caused by gastro-enterostomy. All of these points should make us want sufficient evidence as to the necessity of gastro-enterostomy as a supplementary operation before it be accepted as a routine measure.

To recapitulate:

Gastro-enterostomy is indicated in hematemesis, first, after a thorough search has failed to reveal the source of the hemorrhage; second, where the source of the bleeding is discovered, but in such condition as to make direct treatment impracticable or impossible.

From a sad experience and from a review of the literature we would, in conclusion, endeavor to discountenance the idea, which has become quite prevalent, that nothing is to be gained by searching for the bleeding point, as gastro-enterostomy is all that will be necessary to prevent recurrence of the hemorrhage.

# TWO CASES OF ACUTE HEMATEMESIS IN WHICH GASTRO-ENTEROSTOMY WAS PERFORMED.

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CASE 1.—A lumberman of 37, who had always enjoyed good health, except occasional attacks of "dyspepsia." In February, 1902, he had a severe gastric hemorrhage, followed by two others within a few days, which nearly resulted in his death. He remained very weak for two months, when three more copious hemorrhages occurred in rapid succession. There was never any pain.

On April 21 I found the patient almost exsanguinated and still vomiting some blood. An operation was decided upon at once. The stomach was found to be distended, but neither upon its external surface nor upon the surface of the duodenum could be detected any evidence of an ulcer within. Without further search a posterior gastro-enterostomy was quickly done. A Murphy button was employed, having the end within the stomach smaller than that within the bowel. The stomach contained bloody fluid. Recovery was uninterrupted, the button being passed on the twenty-third day. There was no further hemorrhage.

On November 23, 1902, this patient suddenly died from hematemesis some five months after the operation, the hemorrhages having begun again on July 17, small quantities of blood being frequently vomited subsequently to this date. A reasonable explanation of this unfortunate outcome would seem to rest upon the clos-

ure of the new opening, thus reproducing the gastric condition which originally existed and leading to the development of another ulcer. This tendency to spontaneous closure has been particularly observed in the absence of pyloric obstruction. Was the comparatively small fistula left by the Murphy button in any way to blame, and would the same thing have occurred if a larger opening had been secured by means of one of the suture operations?

CASE 2.—A woman of 55, who had always been in fairly good health except some uneasiness in the epigastric region, with occasional pain, which had been referred to gallstones. During the first few days of October, 1903, she bled from the stomach so profusely as to become almost exsanguinated. My examination showed a pulse of 120, temperature slightly elevated, marked dyspnea, and continuous restlessness and nausea. Small quantities of blood were being vomited at intervals. A posterior gastro-enterostomy was at once done, a Murphy button being used, the ends of which were of unequal size. The stomach showed no external sign of ulcer, and no internal exploration was attempted. The organ was markedly dilated with gas and fluid. Reaction from the operation was so satisfactory that hopes of recovery were entertained, but in spite of no recurrence of the hemorrhage, death took place at the end of fifty hours, due, apparently, to the great loss of blood.

Autopsy revealed an ulcer as large as a watermelon seed on the posterior wall, at the junction of the lower with the upper two-thirds of the stomach. A small atheromatous artery, plugged by a thrombus, could be seen in the floor of the ulcer. The extreme degree to which the stomach was contracted was very noticeable, it being but little if any larger in circumference than the transverse colon. There was no blood in either stomach or intestines, and the anastomosis was perfect, there being not a trace of peritonitis.

These postmortem findings impressed upon me that, in this case at least, the prompt arrest of hemorrhage was due directly to contraction of the stomach, much as post-partum hemorrhage is stopped by contraction of the uterus.

## DISCUSSION

### ON THE PAPERS OF DRS. CONNELL AND FREEMAN.

Dr. H. D. Niles, Salt Lake City, Utah—I have listened, as I have no doubt others have, to these excellent papers with interest. They seem to emphasize the statement that we need to look to treatment based upon a discovery of the disease earlier than that announced by hemorrhage, perforation, or other complications. The time to treat hemorrhage is before it occurs. It seems a little singular that the men who are the strongest advocates of general causes as etiological factors are also the strongest advocates of local measures for its correction. The very men who believe that changes in the blood have to do with the causes of gastric ulcer are not themselves convinced that gastro-enterostomy will correct the condition. The condition of the blood remains unchanged if the operation is successful.

I must differ somewhat from the conclusions reached by Dr. Connell, although we must all agree as to the value of the direct method. There are two reasons why the method is not of great value. One is that the condition of the patient precludes the advisability of opening the stomach, for in so doing it adds materially to the shock; hence I believe that in acute hemorrhage any operative procedure that is likely to succeed will be attended with a high mortality. The second reason is, that it is very difficult to diagnose gastric ulcer from the external appearance of the stomach with sufficient accuracy to deal directly with it, at least to determine upon a course of procedure or an operation. Furthermore, as regards autopsies, I have myself examined some cases where the stomach was opened, where the patients died before operation of hemorrhage from the stomach, and we could not even determine then the cause of the trouble without more or less difficulty, and if investigation before operation was as thorough as it was after operation in searching for gastric ulcer, the shock would have been great, and we perhaps would have thought it

had something to do with the death of the patient. Gastro-enterostomy is not an infallible remedy for the treatment of gastric hemorrhage. At the present time, unless we know where the hemorrhage comes from, or can diagnose the case accurately before opening the stomach, I believe it is better to perform it before the hemorrhage is dangerous, if possible. I think it has a distinct and positive place in the treatment of gastric hemorrhage.

Dr. J. E. Summers, Jr., Omaha, Neb.—Some five years ago a man was brought to the hospital suffering from hematemesis, the result of acute alcoholism. I did a laparotomy, laid the stomach widely open and found hemorrhage coming from probably six or ten (I do not remember now the exact number) small erosions. I used water as hot as I could bear my hand in for irrigation, and controlled the hemorrhage. But it recurred and the man died. I think that no kind of gastro-enterostomy would have availed in this particular case. There are instances of hematemesis that are necessarily fatal from the cause or causes which produced it. In the light of the modern surgery of the stomach, I would be inclined to hold that in cases of ulcer with moderate hemorrhage if we make a good, liberal opening between the intestine and stomach, and then close the duodenum by a purse-string stitch, we would cure the ulcer and prevent the complication known as "vicious circle." In Dr. Freeman's case I have no doubt that the recurrent hemorrhage was due to the closure of the opening.

Dr. James E. Moore, Minneapolis, Minn.—The suggestion that has been made, that we treat gastric hemorrhage by gastro-enterostomy, is necessarily at the present time empirical. It seems to me we have scarcely arrived at that time when we can be positive in our statements as to its value. We know from the past history of these cases that not only a large percentage of them recover from an immediate attack of hemorrhage, but permanently, and it is difficult for us to say after having performed a gastro-enterostomy, and our patient has had no recurrence of hemorrhage, that the operation had anything to do with the recovery. On the other hand, we must remember that under these conditions the operation is necessarily accompanied by a large mortality. It does seem to me that we should be exceedingly careful in making positive statements in regard to this matter. I am glad to have had the opportunity of listening to

these papers by experienced men, but it behooves us to be very careful in drawing conclusions too hastily, and we must remember that nature must be given credit for many things that we do not accomplish by operation.

DR. O. BEVERLY CAMPBELL, St. Joseph, Mo.—I have made sixteen experiments upon dogs to test the permanency of the opening between the stomach and intestine when the pylorus is allowed to remain open. In all of these experiments I used the Connell and Kocher methods of suturing, and in each instance a free opening was made. The dogs were re-operated upon at periods ranging from three to six months. In six cases examined at the end of three months the opening had been so constricted or lessened that the index finger could not be passed through it without using a little force. In six of the cases there was almost total obliteration at the end of six months. In four cases examined at the end of six months the opening was so small that only a small probe could be passed through it. A vicious circle was found to exist in 40 per cent. of the cases. These experiments show that the tendency of the opening made in gastro-enterostomy is to close where the pylorus is unobstructed. The dogs in which a vicious circle existed began to decline in flesh at the end of six weeks or two months following operation.

DR. FERGUSON—Was there any dilatation of the duodenum in those cases in which a vicious circle was established?

DR. CAMPBELL—Yes.

DR. CHARLES H. MAYO, Rochester, Minn.—I wish to report a case in which gastro-enterostomy failed to cure or rather to arrest hemorrhage. During the past year I operated upon a man, 40 years of age, who gave a history of stomach disturbance, with vomiting of large quantities of blood, extending over a few years. By the laboratory test blood was found in the stomach. It was not excessive in quantity, although a few days previously the patient had vomited some blood. At the operation, in examining the stomach, I did not find any external evidence of ulceration. The stomach was dilated. A gastro-enterostomy was performed. He had more hemorrhage afterwards and died on the fourth day. He was very anemic at the time of operation. At the autopsy the intestines were found filled with considerable blood. It

was a posterior gastro-enterostomy after the Mikulicz method, and the line of suturing was perfect. There were no large ulcers in the stomach, but there were two or three points of erosion such as have been described by Dr. Summers in his case. As to what to do in these cases of ulcer, if we are operating on a condition in which there is severe hemorrhage, performing gastro-enterostomy in all such cases of hemorrhage from ulcer of the stomach, we can, through the incision which we intend to make, introduce a small proctoscope through the opening and examine the interior of the stomach. In two or three cases we were not sure that there was an ulcerated area. We found a denudation of the mucous membrane, with no hemorrhage in the stomach. With gauze in the stomach, rubbing it over the mucous membrane, the capillary oozing which takes place in some cases may be limited in area to the size of a thumb-nail, but with a little wiping with the gauze it will show the exact location of the ulcer and the occasion for the hemorrhages in which blood is found in the laboratory test. For a long time we have had the condition described by Dr. Campbell, namely, closure of the new opening, especially following the anterior operation. It has been only recently that we took pains to determine this. Where the pylorus was left open or reopened after healing of the ulcer, we found that the closure of the new opening was due directly to traction. In the anterior operation, you know, we have a long loop of intestine which is fastened to the stomach at the dependent portion, and throughout a great part of the time it is under heavy traction. Any food passing into the bowel through the pylorus means traction upon this opening, and if the pylorus reopens, the traction is increased, so that the bowel pulls away from the stomach, and the result is, if the lumen of the bowel itself is of full size, you will find a fistulous opening in the stomach, whether made by the suture or by the Murphy button. But that dependent condition produces a perfect fistula which is from one to two inches in length. If we are going to do such an operation, it is well to attach the bowel by itself on both sides to relieve absolute traction on the point of union.

DR. D. S. FAIRCHILD, Des Moines, Iowa—It seems to me a distinction should be made between those chronic ulcers which bleed and fissure ulcers which sometimes give rise to severe hemorrhage. These chronic ulcers

are now fairly well treated by gastro-enterostomy, but in a case of fissure ulcer, in which hemorrhage is considerable, gastro-enterostomy is not sufficient. Then it becomes necessary to dissect out the ulcer. I had occasion not long ago to adopt a procedure which I first saw Dr. Mayo use in a case of severe hemorrhage where the stomach was opened; by means of transmitted light in the interior of the stomach through a proctoscope, we found the location of the ulcer. I do not think gastro-enterostomy would have been of any value in that case. It was necessary to stop the hemorrhage here as we would anywhere else. But in cases of hemorrhage for chronic ulcer, gastro-enterostomy would be the desirable course to pursue.

DR. CONNELL (closing the discussion on his part)—I have had recently three cases of acute hematemesis under observation. One of them bled very profusely. Operation was refused, and patient was given up to die. Just about the time the patient was expected to die she began to recover, and is now perfectly well in every sense of the word. Another case was a child, 4 years of age, who had acute hematemesis. Operation was refused and the child died. A third case was operated upon, having in mind Moynihan's advice, that it is unnecessary to search for the bleeding point, as gastro-enterostomy will cause a cessation of the hemorrhage. I did a gastro-enterostomy and the patient died because of a continuation of the hemorrhage. I am confident that had I made a careful examination of the stomach with the object of finding the bleeding point I would have found it. Had the ulcer been removed I am reasonably certain that the patient would have recovered.

DR. FREEMAN (closing the discussion)—There are two kinds of cases upon which we have to operate: one class in which we can take our time, search for the ulcers, and if we find them we can deal with them accordingly. The other class is illustrated by the two examples which I gave in my paper, in which one has to do very quickly what one can. The patient is not strong enough for the surgeon to make a long search for the ulcer. I agree with Dr. Niles, that where the stomach has to be opened and examined posteriorly and anteriorly, and search is made by means of a proctoscope, there is considerable shock. The patient is already extremely anemic and perhaps at the point of death, and we are called upon

to do what we can as rapidly as possible. Quite often we can do a gastro-enterostomy only, and do it in the quickest way we know of. When we are assured, on the one hand, by surgeons that gastro-enterostomy is sufficient to stop hemorrhage in these cases, and, on the other hand, we are told that a prolonged operation is dangerous, we are justified in many cases in contenting ourselves with a mere gastro-enterostomy.

# THE TREATMENT OF POSTERIOR PERFORATIONS OF THE FIXED PORTIONS OF THE DUODENUM.

J. E. SUMMERS, JR., M.D.
OMAHA.

Retroperitoneal perforations of the duodenum are of such infrequent occurrence that little attention has been directed towards their treatment. In fact, after as careful a study as my facilities afford, I have been unable to find anything written upon the subject which is at all satisfactory. During the past year Theodore Kocher[1] has publishes a paper entitled "Mobilisierung des Duodenum und Gastro-duodenostomie," in which he explains very fully, from an anatomical and clinical standpoint, how it is possible and even easy (in the absence of chronic inflammatory conditions involving the head of the pancreas, gall tracts, stomach and perhaps the neighboring under surface of the liver), to so free the descending portion of the duodenum as well as the lower flexure of the duodenum, that by rotating these mobilized parts toward the left, a gastroduodenostomy can be done with great ease—the duodenum and stomach being lifted through the abdominal incision for the more proper carrying out of the technic.

Kocher was preceded in this operation, i. e., "gastroduodenostomie," by Villard, Jaboulay and Henle, but it does not appear from their writings that these surgeons fully comprehended the amount of mobility the duodenum was susceptible of, *after* certain preparatory

1. Centralblatt für Chirurgie, No. 2.

procedures. In passing it may be noted that the intestinal end of the common bile duct has been exposed and attacked after the same preliminary freeing of the duodenum. Although it is not in my province at this time to discuss the advantages pro and con of a gastroduodenostomy over other surgical methods, neither does the surgery of the gall tracts fall within the scope of my paper. I have called attention to both in order that I may emphasize a method which is anatomically and clinically applicable in the treatment of retroperitoneal perforations of the duodenum. The parts involved must be susceptible of exposure and rotation forward into the light of an abdominal incision.

Jeannel[2] has recently collected out of the literature thirty-five cases of injury to the duodenum. Among the subcutaneous perforating injuries he calls attention to the comparative frequency of complete tearing off of the duodenum—there were five such cases, three close below the pylorus and two at the junction of the duodenum and jejunum. This is explained that at these two points a freely movable part of the bowel joins a fixed portion. The incomplete ruptures are found at the lower half of the duodenum. Among twenty cases of incomplete rupture the superior part was involved two times; at the level of the papilla of Valer, four times; below this, but still in the descending part, three times; in the inferior portion, seven times. The sight of the lesion was found fourteen times through the anterior peritoneal bedecked surface and only six times through the posterior wall. In all of these cases except one the direction of the rupture was at right angles to the long axis of the bowel. The length of the tears varied from the very smallest to those involving two-thirds of the circumference. In looking up the subject of gunshot wounds of the duodenum I ran across only one case, reported by Douglas in his recent book upon abdominal surgery; the wound

2. Mikulicz, Kausch: Handbuch der Praktischen Chirurgie, vol. iii, 1903.

involved the first part of the duodenum and was operated upon successfully.

According to Mikulicz[3] no case of posterior perforation of the fixed portions of the duodenum has been operated upon. Cachovié[4] refers to a paper written by himself, "Ueber Fisteln des Duodenum,"[5] in which he discussed the methods of treating these fistulæ by duodenorrhaphy, gastro-enterostomy and jejunostomy, especially calling attention to the necessity of closing the pylorus when a gastro-enterostomy is done in order to prevent the stomach contents passing into the duodenum, and in this way preventing a closure of the fistula. Cachovié reports a case operated on in July, 1902, in which to control a circulous vitiosus he closed the pylorus by a sero-muscularis "tobacco pouch" stitch and likewise shut off, by the same stitch, that part of the jejunum between the gastro-enterostomy opening and that of an entero-anastomosis done four and one-half months previously. On postmortem one and one-half months later it was found that the latter occlusion was complete, the former nearly so.

Should a contusion of the abdomen be followed by signs leading one to suspect a rupture of the duodenum and in consequence an abdominal section be determined upon, or should a stab wound from behind or a gunshot wound from either in front or behind disclose upon section that the posterior fixed duodenum was opened, several things are to be considered in an attempt to repair the injury. First, the relations of the peritoneum in this locality; second, the size and direction of the blood vessels. Huntington[6] has shown very beautifully that in the development of the intestines and of the peritoneum, by rotation from left to right the duodenum becomes fixed, and only covered in front by peri-

3. Praktischen Chirurgie, vol. iii, 1903.
4. Centralblatt für Chirurgie, No. 25, 1903.
5. Archiv für klin. Chirurgie, vol. lxix, No. 3.
6. Anatomy of the Peritoneum and Abdomen.

toneum. The early peritoneal investment, after rotation, blending on the right with the parietal peritoneum.

The mesoduodenum investment blending behind with the primitive parietal peritoneum, by cutting perpendicularly through the peritoneum about three centimeters to the right of the descending portion of the duodenum and insinuating the fingers behind towards the left, it is quite easy to reverse the original rotation. The descending portion of the duodenum and its lower flexure can be lifted out of the bed of loose cellular tissue formed by the fusion of the right mesoduodenum and the primitive parietal peritoneum. This movement exposes the posterior surface of the duodenum and admits of its repair.[7] The relations of the blood vessels determine the limit of the rotation and lifting forward of the bowel. The concave left-sided commencement of the duodenum is supplied with blood by the gastro-epiploica dextra, the chief branch of the gastroduodenalis. Important branches also go to the transverse colon over the inferior portion of the duodenum. These vessels lie under the upper layer of the gastro-colic ligament and offer in themselves little hindrance to the lifting up of the inferior part of the duodenum from the spinal column. If the colon is raised we see the colica dextra, the large branch of the superior mesenteric. This artery runs horizontally from left to right and the branches pass down the duodenum to the lower and lateral circumference and also to the right flexure of the colon. These vessels are not so easily lifted towards the left as those of the gastro-epiploica dextra, but nevertheless they do not prohibit the freeing of the inferior flexure of the duodenum to the extent but that the whole vertical portion or limb may be loosened and brought forward. The rotation is made with hepatico-duodenal ligament above as a fixed point and a continuation downwards of the left border of the duodenum over the head of the pancreas as an axis. The lower fixed point is

7. Kocher: Centralblatt für Chirurgie, No. 2, 1903.

determined by the location of the branches of the colica dextra which limit the rotation and lifting up of the inferior flexure and a portion of the lower duodenum. My own work upon the cadaver convinces me that Kocher is right when he states that by this procedure no damage to blood vessels is done, as the peritoneum is separated from in front of the right kidney and between this and the beginning of the transverse colon and the loose cellular tissue in front of the vena cava and aorta.

At our meeting one year ago I reported a case of hematoma behind the descending duodenum and its lower angle; the pressure of the hematoma caused complete obstruction of the bowels. The blood tumor resulted from a contusion of the anterior abdominal wall, and could be palpated. Upon opening the abdomen, the peritoneum on the right side, i. e., the primitive fused mesoduodenum and parietal peritoneum, appeared like a mesentery. This was incised to evacuate a sufficient bulk of the clot to relieve the obstruction. The exploring fingers could be passed freely behind the vertical portion of the duodenum.

Recently a case of gunshot wound involving the anterior wall of the upper vertical portion of the duodenum and the posterior wall of the duodenum, nearer the lower angle, came under my care. A young man, in attempting to escape from a policeman, was shot in the back by a 38 caliber Colt's revolver, the ball entering just below the twelfth rib and through the outer edge of the erector spinal muscles, coming out in front one and one-half inches below the juncture of the ninth right costal cartilage and the right rectus muscle. One hour after the shooting the patient was etherized under customary hospital surroundings. The abdomen was opened by a vertical incision through the wound of exit. It was observed that the bullet had in its course from behind forward, perforated the duodenum and gall bladder. The wound in the anterior duodenal wall was sutured, likewise both holes in the gall bladder. Because

of the bad condition of the patient it was decided not to attempt to expose the posterior duodenal wall from in front, but rather to rely temporarily upon an incision from behind and the introduction of a gauze pack. In the carrying out of this latter procedure I discovered, as expected, that the bullet had made a groove through the lower pole of the right kidney—another reason for the posterior incision. A liberal gauze *pack drain* was introduced down to the repaired duodenal wound of exit and the wounds of the gall bladder, and the abdomen closed so as to admit of the drainage.

The patient died three days later, the postmortem illustrating the cause of death to be retroperitoneal phlegmonous inflammation without peritonitis. Had the man's condition admitted I would have sutured the wound in the posterior duodenal wall after freeing and rotating the duodenum to the left. In the light of today one should, in a like case, in addition to repairing the duodenal wound or wounds, occlude the pylorus by means of a purse string stitch. Either at this same operation or as soon thereafter as reaction admitted, a gastro-enterostomy must be made. None of the procedures which I have indicated require much time or handling of the intra-abdominal contents; they are the only rational methods of treating a perforation of the posterior wall of the duodenum. It is almost impossible for a gunshot wound of either the stomach or duodenum, which perforates both walls, to be limited to those organs, therefore, under such circumstances, in addition to the repair of any intraperitoneal organs involved, proper incisions must be made to provide for the retroperitoneal drainage. Wiart and Mikulicz recommend a somewhat similar line of practice, although they have had no experience in the practice.

## DISCUSSION.

Dr. A. I. Bouffleur, Chicago—In connection with Dr. Summers' paper, I wish to report a case which occurred in the service of Dr. Fenger a number of years

ago. The case was one of gunshot wound of the duodenum, in which the anterior opening was sutured successfully, but in which the termination was similar to the case reported by Dr. Summers. The cause was also similar, in that there was an active suppurative process established retroperitoneally which was not relieved by posterior drainage. Of course, at that time we were not so much enlightened in regard to these cases, and how to deal with them. The condition was considered practically inoperable at that time.

DR. CHARLES E. BOWERS, Wichita, Kan.—I would like to ask Dr. Summers to explain, if possible, how to make the incision through the anterior wall of the duodenum and suture the opening through that, closing the wound in the anterior wall later.

DR. SUMMERS (closing the discussion)—I suppose it would be perfectly practicable to make the suture as the doctor suggests, but I would rather have a part that I could bring up towards the surface and handle with a reasonable degree of comfort than to attempt to do the operation otherwise. I thought by bringing forward the anatomy of the part, one could understand how we might turn the duodenum over and take advantage of what has been learned by men who have done a great deal of work in the surgery of the stomach and gall tracts, and apply the same principle to the repair of wounds in the posterior portion of the duodenum.

# THE CORRECTION OF RETRODISPLACEMENTS OF THE UTERUS.

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It is unnecessary to occupy your valuable time by going extensively into theories advanced as to the etiology of retrodisplacements of the uterus, or discuss the almost endless train of subjective symptoms that have been attributed to this condition. Nor shall I attempt to trace the evolution of the treatment from the time of Hodge down through the operative measures that have been devised during the last decade. This is history with which you are all familiar.

The uterus, bladder and rectum have their physiological range of motion, and must remain susceptible of motion to perform their functions normally. This being true, there can be no fixed axis of the uterus while it retains its normal relation to the other pelvic organs. Simultaneously with retrodeviation beyond the normal limit of motion, there is a descent of the organ toward the pelvic outlet, with a change of its relation to surrounding viscera, as well as corresponding changes in its blood supply and drainage of its secretions. With pre-existing or subsequent pelvic inflammation, the uterus and adnexæ become fixed in mal position.

It is perhaps the most generally accepted opinion that labor and abortion are the chief etiological factors in the production of retrodisplacements. While we know that damage to the integrity of the pelvic floor with an

infected and heavy uterus frequently acts as a cause, we know equally well that it does not always do so. We encounter at the examining table cases of extensive lacerations with heavy, subinvoluted uteri, in which the axis of the organ is normal. On the other hand, we find cases of extreme retrodeviation in young girls and unmarried women in whom the uterus may be almost infantile in type, perhaps fixed by adhesions. A study of the clinical history of many of these cases will show tubal and pelvic inflammation to have existed. Congenital retrodisplacement is extremely rare.

The consensus of opinion of those who have had the richest experience seems to be that simple, uncomplicated retrodisplacements rarely give rise to disturbing symptoms, and when they coexist they are caused, in large part at least, by other pathologic conditions. No treatment, therefore, should be suggested until a careful examination reveals the relation between the possible causes of the symptoms and the retrodisplacement. To this end, general anesthesia for examination may be necessary. Nothing should be overlooked or taken for granted. We should not be content when we find distended and adherent tubes or a prolapsed and tender ovary, but should explore the rectum for hemorrhoids or fissure, which, as we all know, may give rise to symptoms closely simulating those derived from pathologic conditions within the pelvis.

In the few uncomplicated cases, implying a uterus movable and free from inflammation, but which gives rise to discomfort either psychic or real, the use of a well-fitting pessary in connection, if necessary, with pelvic massage and postural treatment, may be all that is required.

With the advances made by modern, aggressive surgery, the use of the pessary was all but abandoned; there seems to be of late, however, a wave of sentiment back toward its more frequent employment, which pos-

sibly will increase as we learn to differentiate our cases more carefully. After the selection of the proper case for its use, the most serious objection to it is the time required to accomplish a permanent result. Its use implies a patient having the leisure and means which will enable her to be "tied to a doctor's office" for months or years. The same condition occurring in a woman who is obliged to work, standing on her feet many hours each day, demands something different, as she can not afford the protracted treatment of her (perhaps) more fortunate sister. In her case measures must be employed which will restore to her in the least possible time the ability to work comfortably. This, of course, means an operation. Many operations have been devised, the great number being the strongest evidence of their shortcomings. The chief source of failure and disappointment that has attended these operations has probably come from the belief that it was the position of the uterus *per se* that gave rise to symptoms demanding treatment, instead of the coincident pelvic lesions that accompany it. Dysmenorrhea is not an infrequent accompaniment, but is rarely caused by it, and is, therefore, almost never relieved by the correction of the displacement, either by mechanical treatment or operation. When this is the chief symptom complained of, it is wise to be guarded in promising relief.

The organ has been attacked from above and from below; its natural ligaments shortened and new ones made with the central idea of correcting its abnormal axis. With the clearer understanding of pelvic pathology in connection with these cases, I think we may safely look for better results in the cases we operate on, and in our choice of a method one will be selected that enables us to deal with all possible complications.

Of the many operations devised, the ventrosuspension of Kelly and Olshausen and the extraperitoneal shortening of the round ligaments after the Alexander-

Adams method, or some modification of the same, are still the operations in most common use. The vaginal methods of Duhrssen, Mackenrodt and others have not found especial favor on this side of the Atlantic. That ventrosuspension still serves a useful purpose is evidenced by the fact that it is advocated by some of the ablest members of the profession. In doing it, one is enabled to deal with all intrapelvic complications, and it is probably chiefly for this reason that it has held its own against the extraperitoneal methods, notwithstanding the fact that it drags a pelvic organ into the abdomen and creates a source of potential danger that is recognized by all.

The Alexander-Adams operation is applicable only to cases in which the uterus is freely movable and free from pelvic complications. In other words, its application is confined largely to cases where it is least needed and where it can be of the least benefit.

The same argument, I think, obtains, although perhaps to a less degree, to operations done for this condition through the vagina. The advocates of this route insist that they are able to deal as thoroughly with any possible complications found within the pelvis, as through a suprapubic opening. This position, I feel quite sure, will never be accepted by the majority of operators. The slight advantage claimed for the vaginal route can hardly offset its palpable disadvantages. While ready to grant that the majority of cases may be successfully operated on by some method through the vagina, it is certainly true that with tubal infection that has created a mass of matted adhesions involving, perhaps, intestines, or the vermiform appendix, better, cleaner and safer work can be done from above.

The majority of cases require the careful use of the curette as a preliminary step, as endometritis is a common complication. If the cervix is lacerated and hypertrophic, it should be repaired or amputated. Lesions

of the pelvic floor should, of course, be repaired. Whatever the operation selected, it should permit of thorough intra-pelvic work, and should be one that restores the normal axis of the uterus, at the same time leaving it free to adapt itself to its normal range of motion. The operation I am about to describe meets these requirements. It was devised by Dr. George H. Noble of Atlanta, and brought out by him in a paper entitled "Intramural Extraperitoneal Anchorage of the Round Ligament for Posterior Displacement of the Uterus." This paper was read before the Southern Surgical and Gynecological Association at its meeting held in Cincinnati last year. In describing the technic I can do no better than to quote freely from Dr. Noble's paper:[1]

"1. A transverse incision is made through the skin, fascia, fat and aponeurosis down to the recti muscles. This incision, in the ordinary subject, should be about 1½ inches above the pubis, and should extend laterally to the outer border of the recti. The recti are separated vertically in the median line and the peritoneum opened in the same direction. The pelvis is investigated, proper attention given to the local pathological conditions, and the uterus raised.

"2. A pair of light compression forceps with teeth in the end (Senn's) is passed through the abdominal opening, and grasps one of the round ligaments about the middle of its intraperitoneal portion. By traction on the forceps the uterus is pulled somewhat to the side of the pelvis which is opposite the ligament held, the peritoneum is drawn away from the region of the internal abdominal ring, and the ligament made taut so that it may be the more readily recognized in the extraperitoneal manipulations to follow.

"3. Now just beyond the outer edge of the rectus, at the end of the transverse incision, the point of a pair of artery forceps is thrust through the posterior sheath

1. Transactions Southern Surgical and Gynecological Association, 1902, p. 217.

of the muscles, but does not enter the abdomen. The forceps is opened and withdrawn, so that an aperture large enough to admit the index finger is left. The finger is introduced through this opening in the pre-peritoneal fat, and feels the round ligament without difficulty, for it is brought into prominence by tension on the forceps which holds its uterine end.

"4. The finger, passed through the opening just described, is hooked under the extraperitoneal portion of the ligament from below upward, and draws it up into the wound. The sheath of the ligament is then split open by blunt dissection. The sheath and the peritoneum are stripped back in the direction of the uterus, completely divesting the ligament of its covering. It is then drawn out of the wound, and forceps slipped underneath retains it until the opposite ligament is raised and denuded in the same way. If the uterus has been in a state of marked retroversion, the ligaments will have become so attenuated as to allow their approximation in the median line in front of the recti, which approximation will restore the uterus to its normal position.

"5. When it has been determined that the ligaments are long enough to meet in the median line they are each left looped over forceps, while the peritoneum of the median incision and the recti muscles are closed with continuous kangaroo or catgut sutures.

"6. The ligaments are next approximated in front of the recti and tied together.

"7. Now, beginning in one angle of the transverse incision, the cut edges of the aponeurosis are stitched together with a continuous kangaroo suture. When one or two loops of the suture have been passed, the needle, in crossing the interval between the two edges, is made to pass through the ligament. It is well also to pick up a little of the muscle on each side of the ligament in order to provide against dead spaces. This process is

continued as each successive loop is passed until the center of the incision is reached, when the free end of the suture is clamped and left long. Starting in the other angle of the transverse incision (but looping in a contrary direction, so that when the two sutures meet their free ends may be on opposite sides of the wound), a second strand of kangaroo unites the edges of the aponeurosis on that side and picks up the round ligament and adjacent portions of the muscles as before. The kangaroo tendons are tied together, and the ligaments are thus embedded and firmly anchored between the aponeurosis and muscles.

"8. The structures in front of the aponeurosis are closed in the usual manner."

The advantages of the operation may be stated as follows:

There is but one incision and through it any pelvic complication may be treated.

The operation utilizes the strongest part of the round ligament instead of its distal end. The normal mobility of the uterus is not disturbed, and it is left in the pelvis where it belongs.

It causes no vesical irritation or dysuria if the ligaments are not embedded too low down, and no dragging if they are not brought through too high up.

The anchorage is superior in permanency to all peritoneal attachments; the uterine portion of the ligament will not stretch away.

There are no sutures in fundus to irritate the uterus.

The fixation is extraperitoneal; no irritated point invites subsequent adhesions to abdominal viscera.

The peritoneal investment of the ligament is not drawn into the abdominal walls, producing funnel-shaped depressions and inviting hernia.

It does not interfere with the physiological development of the uterus during pregnancy.

During the last year I have made this operation 23

times. In all but 3 there were intrapelvic or other complications. In 10 the appendix vermiformis was removed, either because of a history of definite recurring attacks of appendicitis, or because from its appearance it was deemed wise to remove it. In one case a broad ligament cyst was removed, and in several diseased appendages were taken out. These are mentioned merely to show that there is no difficulty in doing any necessary intrapelvic work through the transverse incision and separation of the recti muscles. In all the cases local office treatment by means of tampons or pessaries had been resorted to without relief. Most of the cases were in women who are obliged to work, and who preferred to undergo an operation rather than submit to further treatment. The three uncomplicated cases were marked neurasthenics with dysmenorrhea. While the displacement remains corrected, there has yet been no improvement in the dysmenorrhea, and little or none in their general condition. There were no deaths or serious complications following these operations. So far as I have been able to follow the cases the results have been all that could be expected.

## DISCUSSION.

Dr. C. H. Wallace, St. Joseph, Mo.—I thoroughly agree with the essayist that there are many cases of retrodisplacements that do not require fixation of the uterus. If the perineum and cervix were repaired and curettage done, many of them return to a fairly normal condition without fixation of the uterus. I wish to refer to the operation which the essayist has credited to Dr. Noble, of Atlanta, Georgia. It seems to me that it is nothing more nor less than a modification of the Tod Gilliam operation, done in a slightly different way. It is a borrowed idea entirely. The Tod Gilliam operation is to my mind a very practical operative procedure and is one of the best that has yet been devised for retrodisplacement of heavy uterus in that by its use there is permanent fixation of the organ.

Dr. O. Beverly Campbell, St. Joseph, Mo.—When Schroeder demonstrated that simple retrodisplacements

of the uterus did not usually cause symptoms or discomfort to the patient, then the Alexander-Adams operation received a setback. It may be recalled that a certain gentleman, once a member of this association, reported three thousand successful cases of his modification of the Alexander operation. It was my painful duty to call in question the possibility of finding three thousand women in which such an operation would be applicable; that such an operation could only be applicable to simple cases of retrodisplacement, uncomplicated by the results of pelvic inflammation. It is now the popular practice to correct retrodisplacements of the uterus by some of the intraperitoneal methods of shortening the round ligaments, or, as in the method spoken of by the author of the paper, by suspending the uterus by the round ligaments. I do not believe that any particular operation upon the round ligaments will meet the indications in every case of retrodisplacement. I am of the opinion that Kelly's suspension operation has still a place in the correction of certain complicated cases, especially where it is found necessary to remove the ovaries. I agree with Schroeder and the essayist that simple retrodisplacements of the uterus do not require operation. If we eliminate such cases, then we must consider as complications in retrodisplacements, every grade of pathology from a slight inflammation of the ovaries and tubes and uterus, to the most marked and extensive pathology. So that in my opinion in a large per cent. of such cases the round ligaments can not be utilized to correct the displacement, as the recurrences will be too numerous. The operation mentioned by the essayist, the Noble operation, is a modification of the Tod Gilliam and the Ferguson operations; it differs in that it teases the round ligaments out from the inguinal canal. It is practically a suspension operation. The round ligament methods of correcting retrodisplacements are now so numerous that one is likely at the time of operation to become perplexed as to making a choice of methods. In quite a large per cent. of my cases of pelvic inflammation complicated by retrodisplacements, I have not deemed it wise to depend upon any of the round ligament methods, but have made a ventro-suspension.

Dr. C. E. Ruth, Keokuk, Iowa—I quite agree with the essayist in the main in regard to the conclusions at which he arrived, and it is unnecessary to review them.

We must not get the opinion that every case of retroflexion of the uterus means the production of symptoms, and until we have those symptoms we are not justified in resorting to an operative procedure. Neither should we think of curing all cases by operation upon the uterus, because it is well known that many cases of dysmenorrhea are not due to obstruction, but they are ovarian in origin, and in such cases it would be folly to expect that we can entirely relieve the dysmenorrhea by correcting the malposition of the uterus. I have had considerable experience in the matter of ventro-suspension, and in the main it has been satisfactory. There are a few cases, however, in which I wish I had not done it, and these have caused me sufficient anxiety, that of late I have been doing the Tod Gilliam operation with a slight modification, but which is not sufficient to justify me in designating it by a distinctive name. I do not think it is well for surgeons to attach their names to every operation they may see fit to modify. It is confusing, and it helps nobody. I have been very much pleased with the results of this modified operation in the few cases in which I have done it. There has been less dragging and discomfort afterwards from the heavy uterus, and the method gives one every opportunity to deal with the pathology that exists in so many of these cases, necessitating the breaking up of adhesions, and the removal of a part or the whole of an ovary or tube on one or the other side.

Dr. Archibald MacLaren, St. Paul, Minn.—I think we will find that the operation that has been suggested (and it seems to me like a reasonable one) will cure about three-fourths of the cases. I do not think any operation so far advanced cures more than three-fourths of the cases, whether it be fixation, the Alexander operation, or shortening the round ligaments through the anterior cul-de-sac, or whether the ligaments be tied behind, or any other method, and I am speaking from my own experience, as about one-fourth of the cases relapse at the end of two years. Pathology unquestionably cuts a very decided figure, and in many of these cases need no operation. A large number of cases of retrodisplacement are comfortable with a pessary, but I doubt whether the pessary ever cures any unless it may be immediately after pregnancy. I have a number of cases that I have seen off and on for ten or fifteen years; they

are perfectly comfortable while they wear pessaries; at times these patients take them out, but sooner or later they have a return of the symptoms. But the wearing of pessaries certainly keeps them out of bed. The Alexander operation performed in cases in which it is indicated and justifiable, has been followed so often by relapse that we have drifted away from it. The suspension operation of Kelly frequently pulled out, and when it was done with silk, one was liable to get adhesions of the fundus in the cul-de-sac, and then the woman is worse off than before. The round ligament operations, either in front or behind the uterus, are liable to be followed by a return of the displacement in a considerable percentage of cases. The reason is because the uterus and the whole pelvic contents sag from relaxation of the utero-sacral ligaments. Dr. Bovée has suggested shortening the utero-sacral ligaments. I have tried very industriously to get at the utero-sacral ligaments in certain cases in which I thought it was called for. I can not say that I can do it, but I am anxious to see some one who can do this, as it is here that the trouble lies, because the cervix has been carried forward and you can not keep the intestines on the back of the uterus. Whether you shorten the round ligaments outside or inside, the uterus will stay forward for a certain length of time, then the intestines will get in front of it, and the displacement recurs. That is the only reason why we are constantly changing from one operation to another. We have all done it. If we can really shorten the utero-sacral ligaments, I believe it will help us out in a certain proportion of cases that have heretofore returned.

Dr. C. E. Bowers, Wichita, Kan.—I would like to ask Dr. Oviatt, in closing the discussion, whether he has ever found trouble following ventro-fixation. It has been my pleasure in two cases on which I operated after the method of ventro-fixation (Kelly) to see both of these pass through pregnancy afterwards without any trouble. I also have knowledge of four others that experienced no difficulty, following this operation, in pregnancy. I have operated some eighteen months after ventro-fixation had been done, in which I found a short pedicle of peritoneum holding the uterus in position.

Dr. Donald Macrae, Jr., Council Bluffs, Iowa—The operation described by the last speaker is no doubt as

good as any (ventro-fixation), but I notice that a great many of those in discussing the paper have deviated from the subject. Therefore, I take the privilege of mentioning a few ideas of my own. I am glad to hear the members of this society, from the standpoint of the discussion so far, call down these promiscuous operations for the relief of so-called retroversions of the uterus. It has always appeared to me foolish and nonsensical in the majority of cases to do any of them. I have had some experience in testing the psychical effect of some of the operations that have been devised and advised for the treatment of displacements of the uterus. I have had many women come to me in whose cases operation had been recommended. There was no pathology present, so far as I could see. There was nothing but a tipping over of the uterus, and yet other operators had advised surgical interference. I have simply put these women in a chair, introduced a pledget of cotton about the size of the end of my finger into the orifice of the vagina, and then asked them how they felt, and they have said to me, "I feel very much better, Doctor." In two or three days they would return and request that another pledget be introduced. (Laughter.) It is time for the society to call a halt in regard to suggesting to patients that there is something the matter with them.

Dr. E. M. Sutton, Peoria, Ill.—While retroversion of the uterus is productive of symptoms, it is not so much the retroversion as it is the change of the axis of the uterus, with consequent prolapse of the uterus, which calls for surgical treatment. As a woman assumes the erect position, with relaxed vaginal outlet, the uterus descends farther and farther, until complete procidentia results. Any of these operations which will correct that tendency and change the axis of the uterus toward the hollow of the sacrum is the operation of choice. With an experience in operating on a number of these cases, I must say that suspension has given me satisfactory results when combined with repair of cervix and vaginal walls. In the births that have occurred since operating on these patients, in only one out of a number of cases has any difficulty occurred, and in this case there was a transverse presentation, a condition which may happen without ventro-suspension. The second labor this patient had required application of forceps above the brim. It seems to me the operation suggested by the essayist

is no better than those we have already, although it shows great skill upon the part of the operator. There is danger of bruising of the ligaments in such a manner that sloughing may take place in some cases and there will be failure to accomplish what one desires. Therefore, I think the intra-abdominal shortening of the round ligaments, as advised by Mann and others, is as practicable as the so-called Tod Gilliam or Noble operation.

Dr. T. E. Potter, St. Joseph, Mo.—If I understand the writer of the paper, he does not condemn these other methods in any sense, nor does he operate in this manner except in extreme cases. I do not think an operation of any kind in a large majority of the cases of simple retroflexion is justifiable. I can not see any particular advantage in this operation over ventro-fixation. I do not doubt that the gentleman can do it skilfully and successfully, yet I fail to see the advantages of it over those of other methods that have been suggested.

Dr. Alexander Hugh Ferguson, Chicago, Ill.—Retrodisplacements of the uterus can be classified, for all practical purposes, under two heads, namely, those with few symptoms in cases of young women, and women that have not been pregnant, who may have ovarian neuralgia, or slight obstructive dysmenorrhea, in whom the uterus is not larger than normal. The other class is those of women who have borne children, and where there is some pathology in the uterus, the Fallopian tubes and ovaries, with more or less prolapse. Occasionally we meet women with a displaced uterus which gives no discomfort whatever. Those women who come to us with displaced uteri generally have symptoms and signs which point to the displacement as having something to do with it, and the opening of the abdomen is usually necessary. I do more and more work in these cases suprapubically than through the vagina. Having opened the abdomen and finding the ovaries, the ovarian ligaments, the Fallopian tubes and the uterus normal, but no prolapse, I do the Webster operation, taking both round ligaments and sewing them posterior to the uterus. This will throw the uterus forward nicely, and makes a beautiful suspension where there is no prolapse and the uterus is not heavy. If I have a case in which the uterus is enlarged and there has been sepsis of some kind or another, and it is necessary to amputate the cervix or to repair a laceration, I should open the abdomen to

rectify the displacement. Not unusually one finds the following: The uterus tipped backward and prolapsed; the ovaries cystic; the ovarian ligaments lengthened; the Fallopian tubes may be open or both ends closed. The ovaries in such a case ought to be split in two, the cysts removed, the round ligaments shortened, and the Fallopian tubes opened, and replace the uterus by an anterior transplantation of the round ligaments. In order to reduce the size of the uterus I have taken a V-shaped piece out of its fundus going down to the mucosa, which had a good effect upon chronic hyperplasia in that it reduced the weight and size of the organ. The principle is the same in the Tod Gilliam, the Noble and Simpson as in the operation I advanced six years ago at a meeting of the American Medical Association held in this city. I believe it was the first method of anterior transplantation of the round ligaments to be found in medical literature. However, in this operation I do not trust to the round ligaments alone, and that is important, because, as Dr. MacLaren has said, the round ligaments may give way, and eventually the uterus is in as bad a position as before. If you take up a portion of the broad ligament with them and take them through the center of the recti muscles, and do away with any possibility of a space behind the anterior attachment, then you have strong ligaments (round ligament and broad ligament) which firmly hold the uterus in place. Four years ago I operated on a woman upon whom a first-class gynecologist had performed the suspension operation of Kelly. I opened her abdomen for partial obstruction of the bowels. Upon opening the abdomen I found fully two-thirds of the small bowel encircling the ligament, which was an inch or more in thickness. There have been several cases reported of deaths having occurred from the Kelly suspension operation. I think suspension of the uterus ought to be discarded.

Dr. H. D. Niles, Salt Lake City, Utah—I believe I am with the minority in the views I hold regarding retroversions of the uterus. To me it seems best to divide these cases into two classes, one class with pathology, the other without it. We should also divide the operations into two classes, one class to be undertaken for the purpose of removing the pathology and the other class of operations performed for the relief of some pathology where no pathology previously existed.

DR. A. E. HERTZLER, Kansas City, Mo.—In connection with the remarks made by Dr. Ferguson, I wish to add a word or two in reference to the treatment of heavy retroverted uteri. They are displaced perhaps because, in the first place, the uterus is too long for the cervix to remain high up in the pelvis. It is my practice in these cases to do a high amputation, tying the uterine artery, and doing whatever operation in addition which seems best, either the Duhrssen operation or some method of shortening the round ligaments through the anterior cul-de-sac or intra-abdominally, if there is no tubal or ovarian lesion. After three or six months, or perhaps a year or so, the uterus, much reduced in size, due to the lessened blood supply, is held in position and many of the symptoms are relieved which are not relieved by any of the other operations mentioned. I have had no experience with the excision of a wedge-shaped piece of the uterus, such as was referred to by the President (Dr. Ferguson), but in view of past experience I am perfectly satisfied with tying the uterine arteries and doing a cervical amputation.

DR. OVIATT (closing the discussion)—I feel gratified that the paper has elicited so much discussion. I think we are all agreed as to the value of the suspension operation of Kelly. I do not believe any one of us has ever made it without feeling a dread that one of the conditions mentioned might develop. Dr. Bowers asked whether I had seen any trouble following ventro-fixation. I have not. I have known of it, and I believe such cases have been reported. I agree with Dr. Campbell that we should not pin our faith to any one operation. I brought forward this operation as one which allows us a wide range to work. We can do anything we want through this one incision. We should operate only on those cases in which we have a definite pathological condition existing in connection with retrodisplacement. I do not believe we should operate for retrodisplacement of the uterus alone.

One gentleman spoke of the operation as being complicated and rather difficult to perform. I think that is one point in its favor. Ventro-suspension by the Kelly method is too easy, and on this account it is too great a temptation for those who want to open the abdomen and stitch the uterus up. If the Kelly suspension operation was more difficult it would not be so frequently done.

The operation I have described is not difficult for any one who is accustomed to operating, but it would be difficult for some of those fellows who are eternally doing the Kelly operation.

In regard to the name of the operation, I agree with the speaker (Dr. Ruth) that it is not wise to name an operation after any man. I do not believe in doing it. I do not think Dr. Noble wants his name attached to this operation. He calls it the intramural extraperitoneal anchorage of the round ligament, and does not attach his name to it. There are many operations that accomplish the same purpose. After hearing a symposium at Cincinnati last year on this subject, I went home and did the Ferguson operation, and obtained as good results with it as with Noble's. I do not believe we should pin our faith to any one operation, but most intra-abdominal operations depend a good deal upon peritoneal adhesions, and that is the thing we should avoid as much as possible. So far as strangulation of a loop of intestine is concerned, that can not obtain. There are no peritoneal bands or adhesions formed by this operation and therefore no possible chance to catch a loop of intestine.

# INTESTINAL PERFORATION IN TYPHOID FEVER.

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According to Hugh M. Taylor, 50,000 to 75,000 deaths occur annually in the United States from typhoid fever. If this is correct, and we accept Osler's statement that one-third of these deaths are due to intestinal perforation, we have, at the lowest estimate, 16,666 deaths annually in the United States due to typhoid perforation. Again, accepting the opinion of Osler, Finney and others who have had the most experience with this condition, that one-half of these lives might be saved by timely operation, we have a grand total of 8,333 persons annually whose lives might be saved by timely surgical intervention. The average age of those dying from typhoid fever is 28.8 years; the greater number being males, most of them the heads of families. If, by carrying out the ideal treatment, 8,333 persons, in the most valuable period of life, might be saved to their families and to the state every year, the subject assumes an importance not to be ignored.

Considering the rapid progress of abdominal surgery during the last fifteen years, the medical profession has been strangely apathetic in realizing the value of the surgical treatment of intestinal perforation occurring in the course of typhoid fever, first formally suggested by Prof. E. Leyden, an internist, of Berlin, in 1884, almost

twenty years ago. In 1887, Lücke of Germany, and Bontecou of Troy, N. Y., each without the knowledge of the other's work, adopted Leyden's suggestion, but neither of their patients recovered. These were the first cases operated in which the definite diagnosis of typhoid perforation was made before the operation; though the honor of the first successful case must be given to Mikulicz, who operated in 1884, the diagnosis of typhoid fever not being made until after the operation.

Why have surgeons as well as internists been so slow in employing operative measures for this emergency? In the first place, the widespread opinion that typhoid patients can not stand anesthetics or major surgical operations, has been an important factor against the general adoption of this procedure. The best answer to a fancy is a fact. While the great mass of the profession shook their heads, a few venturesome ones operated, and it was discovered that patients in the midst of typhoid do stand operation remarkably well, and if the time of the operation does not extend beyond twenty or thirty minutes the deaths from shock are very few. Many of the subjects of perforation are in fairly good physical condition, since it seems to occur in the mild cases relatively as frequently as in the more severe, and is quite a common occurrence after convalescence is well established, being due many times, I believe, to too early increase in the diet.

Another circumstance which has contributed much to cast a doubt on the value of surgical intervention, has been the fact that a large proportion of the operations have been undertaken for general peritonitis, not for mere intestinal perforation. If we continued to hold our appendicitis cases till general peritonitis is present before operating, the present low mortality for appendicitis would not have been reached. It is my opinion that the symptomatology of typhoid perforation as given in our text-books is often much more nearly the symptomatology of general peritonitis than of mere perforation.

The whole trend of modern surgery in other lesions is to put out the incipient blaze before the general conflagration has begun. Shall we make an exception in typhoid perforations? Before the ideal results are reached the rules made use of in other acute surgical diseases must obtain, and operations done as a routine for typhoid perforation, not for general peritonitis.

Even under the past dilatory tactics the results have been exceedingly gratifying. The first twenty-four operations for typhoid fever reported showed six recoveries, or 25 per cent. Keen, in 1898, in his work on "Complications and Sequels of Typhoid Fever," could find but eighty-three cases reported, with sixteen recoveries, or 19.3 per cent. Two years later he succeeded in collecting reports of seventy-five additional cases operated on, with twenty-one recoveries, or 28 per cent. Elsberg, in 1903, gives the result of 131 additional operations, with thirty-eight recoveries, or 29 per cent. Twenty-five of Elsberg's cases were children, with sixteen recoveries, or 64 per cent., thus proving children by far the most favorable subjects for operation for this condition.

When it is considered that a very large number of the operations thus far reported for typhoid fever have not been done until general peritonitis has been fully established, 50 per cent. of recoveries does not seem unreasonable, if done before the advent of the peritonitis. The latest statistics from Johns Hopkins give 41 per cent. of recoveries. There they are striving to operate for the perforation merely, but even there several cases are recorded with a fully developed peritonitis. Another point affecting the mortality is that a small per cent. of the cases dying after operation do not die from the operation or the perforation, but as a result of the general typhoid infection. Such cases should not be charged against the operation. The length of time intervening between the perforation and the moment of operation will tell us much regarding the difference in the mortality between operations for mere perforation and for general peri-

tonitis. Armstrong, in a paper before the Chicago Surgical Society in May, 1902, reports thirty-three cases of typhoid perforation operated on in Montreal. Ten were done within twelve hours after perforation, with four recoveries, 40 per cent.; ten were done from twelve to twenty-four hours after perforation, with one recovery, 10 per cent.; five were done from twenty-four to sixty hours after perforation, with no recovery; one was done seven days after perforation, with recovery. The last consisted merely of opening a circumscribed abscess. Even the twenty cases in Montreal, operated on within twenty-four hours with a mortality of 75 per cent., undoubtedly include a number of cases of general peritonitis, for in many instances peritonitis is developed within two to four hours after the moment of perforation.

The table made by Keen in 1900 showing the time of operation after perforation had occurred in the 158 cases recorded by him, seems to throw a doubt on the value of very early operation. The table follows:

Under twelve hours, twenty-nine died, seven recovered, 19.44 per cent.; twelve to twenty-four hours, twenty-seven died, twelve recovered, 30.76 per cent.; over twenty-four hours, thirty-eight died and six recovered, 13.63 per cent.; time not given, twenty-seven died and twelve recovered, 30.74 per cent.; total, 121 died, thirty-seven recovered, 23.41 per cent.

Keen thinks the greater mortality during the first twelve hours is due to shock.

It occurs to me that this argument for operative delay is more apparent than real. In the first place, those who are very ill, in a stupor, are much less likely to show symptoms of perforation, and the first indication of the calamity is the advent of general peritonitis. It is more than probable that several among those operated on during the first twelve hours belonged to this class. It is also true that when the perforation is large and the fecal leakage extensive, serious symptoms develop immediately, and the earlier operation is likely to be done,

the mortality in this class of cases being higher than among those with minute perforations and little or no extravasation of the bowel contents. Again, some patients are very susceptible to peritoneal irritation, and show marked symptoms from the first, these being very unfavorable subjects for operation. Still further, when for any reason, avoidable or unavoidable, the operation has been postponed, the patients very ill from the disease, those with very large perforations, and those who succumb easily to peritoneal irritation, are likely to be moribund or nearly so after twelve hours, and die without an operation.

On the other hand, those operated on during the second twelve hours are likely to be the cases not so very ill from the disease, those with minute perforations and slight leakage or none at all, and those especially unsusceptible to peritoneal irritation. I am convinced that those operated on during the second twelve hours very largely included cases of this kind and were in every way the better subjects for operation. Not for a moment do I believe that the mortality of Keen's thirty-nine cases, operated on from twelve to twenty-four hours after the perforation, would have been greater had they been operated on during the first twelve hours! On the contrary, I believe that several of those who died might have been saved.

The question of whether or not to operate during the existence of shock has been variously answered by different observers. As might be expected, Keen takes the view that the operation should be done "at the earliest possible moment, only waiting until the primary shock, if present, has passed away." Robert Abbe says: "Operations for perforation should be delayed until shock has passed, say within twelve or eighteen hours."

Most authorities I have been able to consult do not wait for shock to pass away, feeling it is better to run some risk from immediate death rather than a greater risk from a general peritonitis. Cushing says the only

contra-indication to the operation is a moribund condition of the patient. G. G. Davis states that operation should be done at once, even in collapse, rather than wait for severer collapse later on. Armstrong says that when shock is most pronounced is when a large perforation is present with much fecal leakage, and we should not wait for reaction. My own opinion is that if shock is prolonged beyond the time necessary to prepare for operation, the spreading infection of the peritoneum is more dangerous than the operation. That in cases of severe shock, if we wait for a favorable time for operation, we will not operate at all. I would rather operate for perforation without general peritonitis during shock, than for general peritonitis without shock. If we ever expect to reach ideal results in the treatment of typhoid perforation we shall have to make a practice of operating at once, whether shock is present or not, having everything done possible by all known methods to counteract shock while we work, doing the operation in the shortest possible time and with the least possible amount of anesthetic.

The diagnosis of intestinal perforation is not always as easy as the reading of our text-books would lead one to suppose. The keenest observers have failed to recognize it and have operated for supposed perforation when no such condition existed. Many diagnoses of perforation have been made from the symptoms of general peritonitis, symptoms which might have lead to the diagnosis of perforation several hours earlier having been disregarded. The symptoms of perforation are not always violent. Often they are so slight as not to give the alarm. The patient may complain to his nurse of abdominal pain, and be given a hypodermic of morphin, which masks the symptoms effectually until the advent of general peritonitis.

In my own limited experience the most marked symptoms have been abdominal pain, localized tenderness, thoracic breathing and muscular rigidity. Sudden de-

cline of temperature and the phenomena of shock have not been so constant.

*Pain.*—Sudden complaint of severe abdominal pain, which persists, should be considered a danger signal. The location of the pain is variable, but is most often manifest in the umbilical region. Sudden increase of pain which has been present as part of the disease is to be regarded as equally significant.

*Tenderness.*—Still more important is fixed local tenderness, usually below the level of the umbilicus and oftenest to the right of the median line.

*Thoracic Breathing.*—Because of the pain abdominal respiration is less marked than normally, and the respiration is of the thoracic type.

*Muscular Rigidity.*—The pain, tenderness and thoracic respiration were present in the three cases reported, but the muscular rigidity present in Case 1, extremely marked in Case 2, was so slight in Case 3 that I was in doubt about the diagnosis. It is, however, a sign of great value, and I believe it to be almost always present, greatest in the region of the perforation.

*Shock.*—Apparently this is not always present, though a subnormal temperature was observed in two of my cases, not noted in the other. I am convinced that if looked for at the proper time a sudden reduction of temperature would be found in most cases. If the patient is not too ill there is also a feeling of anxiety or impending calamity, often eloquently expressed in the countenance. Chill may or may not be present; also nausea and vomiting occasionally occur, though this is more often an ushering in of general peritonitis. The pulse, if there be much shock, becomes somewhat compressible, followed by an increase in rate.

*Obliteration of liver dullness* is not a frequent phenomenon, and when it occurs may be due to other causes than free gas in the abdominal cavity, as the pushing up of the liver by coils of distended intestines.

*Leucocytosis.*—This is a sign on which little reliance

can be placed. Sometimes it is present, sometimes there is even a reduction in the number of leucocytes. Cabot, in "Clinical Examination of the Blood," says on this point: "It is probable that slight local peritonitis always produces leucocytosis unless the individual is already in a condition of profound general septicemia. On the other hand, a sudden (general) infection of the peritoneum with large quantities of excessively malignant organisms may often result in complete absence of leucocytosis, or a relatively slight rise, followed later by a fall." I think we must conclude with Harte, that "The leucocyte count has proved of very little value at the time most needed."

*Blood Pressure.*—Geo. W. Crile is of the opinion that a sudden rise in blood pressure is an indication of typhoid perforation. In four cases this fact was verified by operation or autopsy. If verified by more extensive observation this may prove a valuable sign in cases of difficult diagnosis.

Red-blood count and estimate of hemoglobin in case differentiation between perforation and hemorrhage is difficult, would doubtless be of much value, as pointed out by Briggs.

The preceding signs and symptoms are many of them present in perforation. The symptoms of the consecutive peritonitis are the usual symptoms of general peritonitis, whatever be its cause, and need not be considered here.

How can the ideal method of treatment, early operation for intestinal perforation before general peritonitis comes on, be realized? If every doctor, whenever he has a case of typhoid fever under treatment, were to have constantly in mind the possibility of perforation, and be prepared for its prompt surgical treatment, a long stride in advance would be accomplished. If I could be allowed to formulate the physician's duty in this respect it would be about as follows: (1) Toward the end of the second week he should instruct the nurse

to be on the lookout for sudden abdominal pain and tenderness, and on the occurrence of either of these symptoms not to give morphin, but at once to inform him of these conditions. She should frequently note the temperature and be on the lookout for symptoms of shock. (2) At every visit of the physician he should satisfy himself that no perforation has occurred. This should not be a mere formality, but every leading symptom of perforation should be shown to be absent before his examination is complete. (3) If any doubtful symptoms arise at any time he should not dismiss the question until he is positive of the non-existence of perforation. (4) If he can not disprove the existence of perforation beyond a doubt, an experienced consultant—preferably a surgeon—should be called, not in the afternoon or the following morning, but at once. Under no circumstances should morphin be given until the diagnosis is cleared up, nor should even as much as a drop of water be allowed to enter the stomach. (5) If the symptoms of perforation are, to the physician's mind, fairly convincing, he should immediately ask a surgeon to come at once, prepared to operate, and should have the nurse rapidly prepare for operation.

The duty of a surgeon when called to such a case is, first, to be prompt. If the diagnosis of perforation is fairly certain, immediate operation should be done. The family should be informed of the condition of affairs in a way to convince and the necessity of avoiding delay should be insisted on. Transportation to a hospital is likely to increase the leakage and disseminate infection, therefore the operation should be done in the house where the perforation occurred.

There is another class of cases in which absolute diagnosis of perforation is impossible. The line of procedure in such a case is not so positive. Even here the dictum of Cushing, "When reasonably in doubt, explore," is the safest rule to follow. In doubtful cases Osler believes in giving the patient the benefit of the doubt and operating.

Richardson expresses the opinion that operation should be done "when the perforation is suspected rather than demonstrated." Several operations have already been done and no perforation found, no ill consequences resulting. The symptoms in some of these cases have been demonstrated to be peritoneal irritation or infection from an ulcer about to perforate, and several observers, notably Finney, Cushing, Keen and Briggs, have attempted to formulate the symptoms of this so-called pre-perforative stage, with the view of anticipating perforation by operation. Although not denying that in rare cases such refinement in diagnosis may be reached, I believe that usually it will be chimerical. Peritonitis may arise without perforation, just as a perforation of the appendix is unnecessary to produce a local or even a general peritonitis, but to call this a pre-perforative stage is not correct, and not borne out by the facts, for perforation might never occur in such a condition. Operation for a non-perforative peritonitis is undoubtedly good practice, I only object to the use of the term "pre-perforative stage."

When the surgeon is called and finds general peritonitis already developed, it is unquestionably his duty to operate if not moribund, for some of these cases can be saved by this means. Murphy has reported six successive cases of general suppurative peritonitis, one of them due to typhoid perforation, all of them recovering after operation. Although our duty is clear to do all in our power to save the cases of general peritonitis by the most radical procedure called for, these cases should not be classed with those operated on early. Our whole effort may reasonably be directed to anticipating the general peritonitis by operation for the perforation before infection begins.

The technic of operation is not a fruitful subject for discussion. There seems little disagreeament in regard to the technic, all the trouble seeming to arise from the lateness in which the technic is made use of.

The best incision is doubtless along the right semilunaris or through the outer border of the right rectus muscle. The cecum and appendix are first found and inspected, and then careful search is made along the lower three feet of the ileum where the perforation, if present, is found in most instances. The next most likely place to find the perforation is in the sigmoid flexure. The size of the perforation varies from a pin point to a ragged hole encompassing half the circumference of the ileum, as in my second case. In about 85 per cent. of the cases the perforation is single.

To close the perforation fine silk is used, with a Halstead mattress suture or a running suture, the direction in which the stitch is passed being parallel with the bowel so as to encroach as little as possible on the lumen. No paring of the edges of the opening is called for, simple infolding being sufficient. If several perforations are present crowded together, I doubt whether resection is ever justifiable, this being too formidable an operation for the patient to bear. In such a case the loop may be pulled up into the wound and an artificial anus established, or gauze may be packed about the loop containing the perforation and complete segregation of the point of leakage made from the rest of the abdominal cavity.

Enterostomy has been formally proposed as a substitute for suture of the perforation, and the results in the few cases reported by this method are so favorable that it deserves further investigation. Escher of the Triest City Hospital, in Austria, reports four operations made by this method with three recoveries, and has collected ten other cases treated by enterostomy with four recoveries. This makes fourteen operations with seven recoveries, the ideal result we are striving to reach. Where much gas is present especially this procedure would look promising, quickly doing away with the excess of gas. The artificial opening can later be remedied by a simple operation.

After disposing of the perforation, the extravasated bowel contents must be removed from the peritoneal cavity. If only a slight amount is present, and localized near the perforation, I would use no irrigation, fearing to spread the infective material broadcast through the abdomen. In this condition careful wiping out of the fecal matter will suffice. On the other hand, where the leakage has been extensive and has become scattered, copious irrigations with normal salt solution are most effective, directing the point of the irrigator to all parts of the cavity, giving especial care to the pelvis and flanks. When all seems clear, thorough drainage with tubes and large cigarette drains, here also being careful that the pelvis and flanks are thoroughly drained. There may be cases where drainage is not required, but it can scarcely be dispensed with unless the amount of leakage has been practically *nil* and the operation has been done at a very early hour.

The operation should be carried out as expeditiously as possible, bearing in mind that the patient is in no condition to endure a prolonged operation. Every effort should be made to overcome shock, if already present, or to avoid it.

Much has been said regarding local anesthesia in these cases, but I doubt the wisdom of operating without a general anesthetic. The shock from the pain and nervousness and fright will in most cases be greater than the shock from a general anesthetic. Furthermore, under local anesthesia the operation takes longer, and is not likely to be as thorough.

My own choice in this matter is to use ether by the drop method, make the incision and search for the perforation quickly, and as soon as the perforation or perforations are found, stop the anesthetic, the closure of the perforation, and the peritoneal toilette giving very little pain and usually they will be completed before the patient regains much sensitiveness.

I shall not consume your time by a consideration of the treatment of general peritonitis due to perforation, since the same conditions hold here as in peritonitis due to other causes.

I append a brief résumé of three cases that have come under my observation. The first was operated on the third day after the perforation symptoms arose, death following twenty-four hours later. The second was operated on twenty-six hours after perforation, and was followed by death in eighteen hours. The third was seen only seven hours after the perforation occurred, and there was so much doubt about the diagnosis that no operation was done. As the later history and the autopsy showed, this was the most favorable case among the three for operation, and has served to stimulate me to a study of the subject and to revise my opinions on the treatment of this condition.

Case 1.—Male, 17 years, in the third week of typhoid fever, three other members of his family being down with typical typhoid. Brought to Immanuel Hospital from his home in Florence, Neb., June 29, 1895, with a history of having been progressing favorably till two days before, when he was suddenly seized with intense pain in the right lower abdomen, which had continued since that time, abdominal distension increasing.

Condition on admission, temperature 103.5, pulse 140; thoracic breathing and great abdominal distension. Tenderness everywhere, but greatest in right lower quadrant. Immediate operation. Incision in right semilunaris. General suppurative peritonitis present, with a large perforation of the appendix. Appendix removed, there being few adhesions, abdominal cavity thoroughly flushed, and drained with gauze and rubber drainage tubes. Ether anesthesia. Patient apparently rallied fairly well, but in a few hours began to fail, and died twenty-four hours after the operation.

The appendix was submitted to Dr. W. R. Lavender,

professor of pathology in Omaha Medical College, who stated that he found the bacillus typhosis and pronounced it a true typhoidal perforation due to ulceration of a solitary follicle.

CASE 2.—Male, aged 22. At 4 a. m., Nov. 7, 1902, I reached a farm house four miles from Central City, Neb., where I had been summoned by the Drs. Benton to see a case of intestinal perforation occurring early in the third week of typhoid fever. He had been quite ill, but with no alarming symptoms till 2 a. m., November 6, when a sudden intense pain occurred just below the umbilicus, which persisted, and Dr. J. E. Benton was called. He found the temperature 97 F., pulse 110, abdominal tenderness marked just below umbilicus, and to the right of the median line. Considerable rigidity of the right rectus muscle. Not improving by the afternoon, I was summoned.

Condition at time of my visit, temperature 102, pulse 112; the most intense rigidity of abdominal muscles it has ever been my fortune to observe. Abdominal respiration seemed entirely suspended, his respiration being of the thoracic type. Still complaining of pain, but not so intense. General abdominal tenderness, but most intense near the McBurney point. His countenance did not have the expression of such acute illness as would be expected from his other symptoms.

Immediate operation. Incision through the outer border of the right rectus muscle. Large quantities of fecal material free in the abdominal cavity. A large perforation was found in the ileum, about two feet from the ileacecal valve. It was very ragged, and large enough for one to have inserted two fingers, and included one-half the circumference of the bowel. By a hasty suture the leak was closed. Next a large quantity of normal salt solution was used for irrigation. It was estimated that a quart of feces was washed out of the pelvis. General peritonitis was present. Thorough

drainage used. Returned to bed apparently none the worse from the operation, but he sank and died twenty hours after the operation. No leucocyte count was made.

CASE 3.—Male, 19 years, was seen at the South Omaha Hospital; in consultation was Dr. Curtis, Dec. 15, 1902. The young man had been ill with typhoid fever, as nearly as could be estimated, about two weeks. Decembed 12 he had had an intestinal hemorrhage, which had depressed him greatly. A few hours after the hemorrhage, a blood count had been made, showing 9,000 leucocytes. After the hemorrhage, he progressed fairly well, the temperature ranging from 101 to 103.5 degrees, till about 7 a. m., December 15, when he complained of abdominal pain, but not so marked as in Cases 1 and 2. His temperature dropped to 97.4 degrees, just after the complaint of pain, but rapidly rose again.

When seen by me, about eight hours after the symptoms of abdominal pain began, his temperature was 102 degrees, pulse soft, and 116 per minute. Respiration not hurried, slight abdominal distension, almost no abdominal rigidity, some tenderness in right lower quadrant, but not marked. Leucocyte count showed 11,000; no vomiting. Considering the absence of abdominal rigidity, the slight amount of pain and tenderness, and the history of the previous hemorrhage, I could not feel fully convinced that a perforation was present. No operation was done.

Gradual increase in pulse rate, and death occurred thirty-six hours after the onset of the abdominal pain. An incomplete autopsy showed a perforation approximately thirty-six inches from the iliocecal valve.

In this last case I can not help thinking that frequent estimation of the hemoglobin and a red blood cell count might have been of material value—differentiating between intestinal perforation and hemorrhage.

## DISCUSSION.

DR. EDMUND J. A. ROGERS, Denver, Colo.—I think a main point in this paper, and one which needs to be reiterated, is this, that if we wait for a positive diagnosis in cases of perforation, we will often be too late with our operation. In the majority of cases of perforation in typhoid fever, a positive diagnosis of perforation can not be immediately made, and we must proceed on general indications without waiting for absolute, positive local signs. A case of unusual interest in points of diagnosis, location of perforation and treatment, came into my hands a few months ago, the particulars of which I should like to detail.

Through the kindness of Dr. David Thompson I was called to see B. B., aged 24, apparently in the third week of a moderately severe typhoid fever. He had experienced a marked change in symptoms during the latter part of the night of Oct. 14, 1903. There was a rapid rise of pulse rate, considerable rise in temperature, although not greater than that experienced during each of several previous days, and a marked, rapid onset of tympanitis with some abdominal pains. I was called to see him about 10 a. m., when the tympanitis was the marked condition. At this time there was some epigastric pain, and some tenderness in the iliocecal region. The distention was uniform throughout the whole abdomen, and all liver dullness had disappeared. His physician stated positively that there had been no tympanitis previous to this change, and that the liver dullness had been marked and distinct the day before. The man's general expression indicated marked nervous depression and a threatened collapse. I advised immediate operation, but it was after 4 p. m. before the consent of his friends could be obtained, and we then operated. Owing to tenderness in the ileocecal region I hesitated whether to make a right or central incision, but fortunately decided on the central.

On perforating the peritoneum there was a profuse escape of fetid gas, confirming the diagnosis. On exposing the intestines it was found that they were not distended, and search for the perforation was made. Repeated examination of the small and accessible large intestines failed, however, to discover any opening, and had it not been for the positive indication of the free

gas the search would have been given up and the abdomen closed.

Knowing that there must be a perforation somewhere, I filled the cavity with salt solution and adopted the cycler's device for finding a puncture. As I moved the large intestines from the wall, I found to my satisfaction that when I reached the splenic flexure of the colon profuse bubbling occurred with the escape of very fetid gas. On closer manipulation I found the perforation to be immediately on the upper, outer surface of the flexure, close to the reflexion of the peritoneum. The orifice could not be reached by the central incision, and I therefore extended the upper end of my incision completely to the side. The wall of the intestine was so softened that it was difficult to make the sutures hold, but I finally succeeded and anchored the intestine to the abdominal wall and left gauze drainage down to the area. The patient survived the operation only thirty-six hours, dying apparently of general peritonitis.

The unusual seat of the perforation and the means to which I was obliged to resort to locate it appear to me of sufficient interest to excuse my reporting it in detail to you.

Dr. Van Buren Knott, Sioux City, Iowa—The experience of Dr. Davis coincides in the main with my own. I have had three cases of typhoid perforation with two deaths. One of the fatal cases came to operation eighteen hours after perforation and the other about thirty. In both the predominating symptoms were those of peritonitis. These two cases were under the care of a very good man and I think that if he failed to recognize the perforation until the symptoms of peritonitis appeared I should also have failed to do so.

In the third case the perforation occurred during convalescence from typhoid and was rather lucky. The patient was a young man who came from the South. He had an attack of typhoid in Atlanta, Ga., was under good care and came back to Sioux City as he thought, about well. He was not feeling well when he arrived and soon went to bed. I saw him with the attending physician a few days later, when he presented symptoms of a localized abscess due to perforative appendicitis. Operation was undertaken with that diagnosis. The appendix was found to be normal. Below there was an abscess well localized, in the center of which was a coil of ileum

with a perforation of small size, through which was escaping minute quantities of fecal matter. The rent in the gut was repaired and the abscess cavity drained without breaking up the limiting adhesions. I would like to emphasize the fact brought out by Dr. Davis, namely, that an attempt to do these operations under local anesthesia is an error. In the one case in which I tried it I had to resort to general anesthesia because of the resistance of the patient and increased shock. I do not consider it to be as safe as general anesthesia for most of these cases.

DR. JAMES E. MOORE, Minneapolis, Minn.—I have been greatly interested in Dr. Davis' exceptionally able paper. He has dealt with a subject which is of interest to us all. We all agree that the early time is the proper time to operate. I want to add a little experience of my own. It has been mentioned before, but I will relate it again, as it pertains to successful operations for perforative typhoid fever ulcer. The operation in my case was performed the third day after perforation occurred, when general peritonitis was present. The patient recovered. It was one of those cases mentioned by Dr. Davis in which a diagnosis of typhoid was not made. It was a mild case, but it was unquestionably one of typhoid, as there were ulcerative Peyer's patches in the neighborhood of the perforating ulcer. This and other cases will give us hope, even though we are called late, and they justify us in trying to save lives.

DR. A. I. BOUFFLEUR, Chicago—I desire to reiterate the statement made by Dr. Moore as to the great value and instructiveness of Dr. Davis' paper. The essayist mentioned the fact that it was necessary at times to make a differential diagnosis between perforation and hemorrhage. One case I operated on was unquestionably one in which there was a difference of opinion as to whether or not hemorrhage or perforation was present. This case came under my observation several years ago, before we found out the value of the blood count. In that case we were able, by making a small exploratory incision, to expose the intestine, which was filled with blood, and in which there was no evidence of any extravasation into the abdominal cavity; therefore, the abdominal wound was promptly closed and the patient progressed to a favorable termination, so that even in cases of doubt as to whether there has been perforation or marked hem-

orrhage, operation is not necessarily fraught with serious danger. Personally I have had experience with three cases of perforation of the intestines, and the only case that recovered was the one that was not operated on. Two were operated on. One occurred a number of years ago, when the subject of operation first came up. In that case several hours had elapsed (I do not recall now the exact number of hours, but at least ten or twelve) from the time perforation occurred until operation was performed. A hurried operation was done in this case, but in which the progress of the man's exit was not materially interfered with. The next case occurred about a year ago, in which perforation was diagnosed by a very competent man about 10 o'clock in the morning. A member of the hospital staff was expected to operate during his clinic from 10 to 12 o'clock, but he did not get to it for some reason or other, and as I was operating in another room at the time, I was told about the case. We did a rapid operation, using local anesthesia, and I do not know but what I would use it again under similar circumstances, as the man's condition was extreme. To counteract the shock the patient was given saline infusion, which was begun before I began the operation, and I do not think the operation added materially to the seriousness of his condition in any particular. When the abdomen was opened, in making an examination without manipulating the intestine, by lifting up the abdominal wall to see what we could, we were rewarded by finding a good, free, well-formed bowel movement, more than you could hold in one hand, off to the left side of the median line. It was well formed, but there was some which had become mixed with abdominal fluid, and therefore it was necessary to irrigate. The perforation was as large as a nickel, and right in line at about two inches distant there were four others, one of which ruptured as the intestine was manipulated. This was a case in which there was no hope, and so recognized before operation, but the operation did not add particularly to the gravity of the patient's condition. I am sure, if he had been operated upon as promptly as the diagnosis was made, the chances for recovery would have been at least fair. The other case was one which occurred in a small boy when I was yet engaged in general practice. He was in the third week of his typhoid course. He was seized suddenly with a violent localized pain in the left

side of the abdomen and immediately went into collapse at about 2 o'clock in the morning. The nurse notified me promptly, and as I lived only a block and a half away, I was at the bedside in twenty minutes. I advised operation, which was refused by the parents, so that the only thing to do was to treat the case medically, which I did by nearly poisoning the little fellow with morphin. This proved successful in that by giving him repeated doses of morphin and local applications to the parts we stopped the peristalsis completely and the case progressed to a favorable termination. A local swelling formed, which was easily recognized for two weeks, but which gradually subsided, and, as far as we were able to determine, there were no symptoms resulting from it. Of course, in this case the diagnosis was clinical, and by the appearance of the swelling sufficiently definite to warrant a diagnosis of perforation, and we were able, having seen the case promptly, to localize the extravasation and consequently we had a localized process instead of a general peritonitis. The plain indication in perforation is first to operate if the environments are favorable and, second, to secure absolute quietude of the bowels by the withholding of everything from the stomach and the use of an opiate. In short, operate if you can and treat expectantly if you must.

DR. C. H. WALLACE, St. Joseph, Mo.—I am particularly interested in this paper. I did not intend to discuss it, but the report of the cases by the last speaker reminds me of a case I had some years ago. The patient was a man, 35 years of age, who suffered from a second attack of typhoid fever. He was taken suddenly with an acute, sharp pain in the right side, and when I reached him he exclaimed: "Doctor, my gut is ruptured. I was seized with intense pain and felt something escape into the cavity." I gave him a hypodermic injection of morphin. He refused operation. I put an ice-bag on him, and controlled peristalsis, so that there was no further escape of gas or fecal matter. There was pronounced shock, which after continuing for some ten hours, gradually subsided, with local tenderness, and the man recovered. This case showed that where we have a localized perforation nature may take care of it. I have no doubt it was a perforation, as in the case mentioned by the last speaker (Dr. Bouffleur), where nature had taken care of it.

DR. H. A. SIFTON, Milwaukee, Wis.—Years ago, when I was engaged in general practice, I had two cases of perforation of the intestine following typhoid fever, and I believe a careful examination of the patients will usually reveal perforation. It does not seem to me that in the majority of cases it is so difficult to make a diagnosis of perforation. In both of them the perforation was confirmed by postmortem examinations. The first case of perforation I operated on occurred in 1895. The diagnosis was made within a few hours after perforation had taken place, and operation was followed by recovery. The next case I saw two or three years ago; the perforation in this case was in the appendix. The patient had recovered from an attack of typhoid fever, or apparently so, because he was out of bed. He ate a hearty meal, and was subsequently attacked with what was diagnosed as a rupture of the intestinal canal. It proved to be on ulcer situated at the base of the appendix. There were a number of patches to be seen on the ileum when it was drawn into the wound. This case resulted fatally. I operated on another case this winter within sixteen hours after perforation took place. The patient lived fourteen days after operation, and while I do not like to say that the patient died from a continuance of the typhoid fever, postmortem examination showed there was localized peritonitis; the wound failed to unite throughout. There was a considerable amount of pus and infective material in the wound and in the layers of muscle, so that although he did not die promptly, still he died to a certain extent at least from the sepsis resulting from the operation.

DR. C. E. BOWERS, Wichita, Kan.—There is one important point that has not been brought out in the paper nor in the discussion in connection with this subject, and that is in regard to the location of the perforation. The element of time is of the utmost importance, and therefore, in searching for perforation of the intestine the result of a typhoid fever ulcer, it is to be remembered that perforation seldom, if ever, occurs higher than three feet above the ileocecal valve. You can save time very much by satisfying yourselves that perforation does not occur above that point.

DR. H. G. WETHERILL, Denver, Colo.—There have been a number of cases reported of what appeared to have been perforations from typhoid fever, as, for in-

stance, the case cited by Dr. Moore, in which an operation was performed three days after perforation had occurred, and two other cases in which operation was not done, with recovery of the patients. It seems to me important to call attention to the symptoms which may arise as a result of erosion of the mucous membrane and the transmigration of bacteria through the unruptured serous coat, and it must be remembered that this condition of things does actually occur, perhaps more frequently than we have heretofore believed. These cases the gentleman reported as cases of perforation probably were of this class. Even in the the case of Dr. Moore there may have been a preperforative stage for 24 or 48 hours. There is another feature which is very important, and that is the diet and treatment of typhoid fever in their relation to perforation. The time is not far distant when the general practitioner will reach the conclusion which surgery has pointed out, that a milk diet is not the best for typhoid fever patients. Those of us who do abdominal work have demonstrated that a milk diet is by all odds the worst in abdominal cases. What rational reason is there for feeding a patient on milk in typhoid fever, when we know we are putting into the stomach and intestines of that patient a material which is an ideal culture medium for intestinal bacteria? When the general practitioner gets away from the fallacy of a milk diet and puts his patients on a soup diet, or, what is better still, the fasting plan of Ochsner, which is so applicable to the perforative stages of appendicitis, or to cases of appendicitis with threatened perforation, then I venture to predict we will do fewer operations for perforations, and that the results of operations, when done, will be very much better.

Dr. T. E. Potter, St. Joseph Mo.—In the study of the important question as to the time when an operation should be performed, I think there is a great deal of attention necessary on the part of the physician. Take any active man who is down with a mild case of typhoid fever, when perforation has been diagnosed, undoubtedly an early operation should be made, because the absorbents are active and the escape of toxins into the peritoneal cavity should be most readily absorbed; while in a case such as Dr. Moore reported, the absorbents were inactive. The individual, to a large extent no doubt, was immune. He got septic infection because he had been

struggling against this condition for ten days or more. In a case in which perforation takes place, to delay operation until the period of shock has passed away would be the most rational thing to do. In those cases in which we have to exercise a great deal of good horse sense, and in children especially, where the absorbents are active, early operation should be performed.

DR. DAVIS (closing the discussion)—I am gratified at the discussion my paper has received. I do not want the paper to be understood as advocating the shirking of responsibility on our part in those cases in which we are not called until general peritonitis has taken place. Here we should do all we can, and in those that seem at all favorable we should operate, because many cases have been reported in which recoveries have followed a general peritonitis following typhoid perforation. The entire plea of the paper has been toward early recognition of the perforation and early operation. Of two cases reported in the paper, both had symptoms from the start which ought to have enabled one to make an immediate diagnosis. The first one had striking symptoms at the beginning. In the second case the physician in charge made an effort to get me as soon as possible after the perforation had occurred. I rode nearly all night in order to reach the patient, and arrived at the house 26 hours after perforation had occurred. I found fully a quart of feces in the pelvis. The opening was large enough to admit two fingers. I did not suppose such a large perforation would ever occur. It was situated about twenty inches from the ileocecal valve.

I was called to see another case seven hours after symptoms occurred. Three days before the patient had had a severe intestinal hemorrhage, and the symptoms this time were similar to those the physician described before. The leucocyte count after hemorrhage had taken place was 9,000; after the symptoms which meant perforation, the leucocyte count was 11,000. There was very little difference in the leucocyte count in the two cases, and I had been led not to place much confidence in the leucocyte count. In this particular case there was absence of abdominal rigidity. The abdomen was soft and flaccid, and although a little tender, I could press on it. In the case before we had the most intense abdominal rigidity that it has been my fortune to see, so that was the thing that caused me to have some doubt. I have

concluded, when we have a case of that kind, in which there is reasonable doubt, it is wise to explore and see whether perforation exists or not rather than let the patient die from perforation. In the last case postmortem examination showed that the perforation had taken place about thirty inches from the ileocecal valve. The patient might have recovered if I had operated.

# THE SURGICAL TREATMENT OF GOITER.

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The statistics of the continental surgeons in reference to goiter has greatly added to the wholesome respect we have held as to their surgical skill. There the various operative methods of affording relief have been advanced to a high state of perfection. Especially is this true in localities in which goiter is endemic, where many surgeons have done hundreds, a few over a thousand, and the great surgeon, Kocher, is well along now in his third thousand of operations for goiter. Their mortality is low, and becomes less with increasing experience. In this country, where the disease is comparatively rare, the greater proportion of operations have been from necessity, and too often were delayed until a fatal result was a not infrequent occurrence. Few operators have had a large experience, and the mortality has been somewhat higher, taken as a whole, than that of continental surgeons; but possibly this difference is not so great for the cases of the same average severity when operated upon.

There are a few points in the development, location, structure and function of the thyroid gland which are so directly associated with the disease and symptoms produced that a brief review of the anatomy of the organ will be of advantage. The thyroid gland consists of three parts—two lateral lobes and an isthmus. Each lateral lobe is about two inches long and pointed at the

upper end. The isthmus unites their lower inner portions across the trachea, covering from the first to the fourth tracheal rings. The whole gland weighs from one to one and one-half ounces. In the development of the thyroid gland, the inversion takes place from the pharynx, the superior inversion being at the back of the tongue, and the remains of the nearly closed duct is known as the foramen cecum, while the remainder of the duct usually becomes atrophied to a cord extending through the tongue toward the hyoid bone. In 43 per cent. of cases a so-called middle or pyramidal lobe is present, extending from the upper border of the isthmus toward the hyoid bone. It is in these lines of inversion that the accessory thyroids are more often found, a condition which has been thoroughly described by Dr. Bernays. The gland consists of a number of alveoli of small size and various shapes. It is covered by a delicate connective tissue capsule, in and beneath which, upon the surface of the gland, is the venous plexus. Penetrating the gland in all directions from the capsule are delicate connective tissue layers which form and support the alveoli, and in which are located the lymphatic vessels of the gland. The superior thyroid artery from the external carotid supplies the upper horn, entering the capsule at its apex and anastomosing freely with the vessels of the opposite side and the inferior thyroid artery below. The latter vessel arises from the thyroid axis, and enters the gland on its inner inferior surface next the trachea at a point called the hilus. At this point the vessel and gland are in close relation to the recurrent laryngeal nerve, and it is in the ligation of this artery next to the gland that this nerve is so frequently injured. There is occasionally another artery found called the thyroidima; arising from the aorta or innominate artery, it ascends upon the trachea and enters the isthmus. The veins are the superior and lateral, which enter the internal jugular,

and the inferior, which is usually quite large, arising from the venous plexus of the capsule, and from either side they usually unite to enter the left innominate vein.

In disease of the gland, the number of veins may be somewhat increased, but the location is nearly constant. The capsule is extremely thin, but behind it divides into two layers, one inclosing the gland, the other passing behind the pharynx and esophagus. A firm band of connective tissue is also attached on each side of the cricoid cartilage, and becomes blended with the capsule to act as a sling support. This peculiar formation of the capsule explains the dyspnea, from lateral pressure of the trachea, often complained of in enlargement, and also why even large tumors are firmly held to the trachea. In certain types of goiter this capsule becomes greatly thickened. Dysphagia may occasionally be present and at times dysphonia. The nerves are derived from the middle and inferior cervical ganglion of the sympathetic as well as the inferior and the external laryngeal nerves. The gland has no duct, but is well supplied with lymphatics, which Baber has shown are filled with the same semiviscid colloid secretion found in the alveoli of the gland, and it is probable that they act as ducts in carrying the secretion to the circulation by way of the tracheal and cervical glands. This theory of the lymphatic system acting as the carrier of secretion from the ductless glands to the circulation, aids in explaining the etiology of various tumors and retention cysts from their inactivity, as well as thyroidism from oversecretion and absorption. These lymph glands, as well as those of the mediastinum, are early involved in malignant disease of this organ, and contribute largely in rendering operations for the relief of such diseases only palliative or worse.

The function of the thyroid is a question still under discussion. We know that children born without a

thyroid and those who early lose them by operation or atrophy develop a condition known as cretinism. That those in adult life who in any way lose the function of the gland develop myxedema. Tetany may also develop from arrested function—well-known conditions which it is unnecessary to describe at this time. We know that an excess of activity of the thyroid function develops a condition known as exophthalmic goiter, or Graves' diseases, or Basedow's disease. The symptoms of these are characterized by rapid pulse, goiter, protrusion of the eyeballs, retraction of the upper lid, muscle tremor and nervous symptoms. The main symptom is the tachycardia and muscle tremor, other symptoms and the prominence of any depending upon the patient and the stage of the disease. The various changes in the thyroid, aside from malignant, tubercular, syphilitic or hydatid diseases, are such as might be expected from its structure, namely, atrophy, hypertrophy, cysts, adenomas, fibroid or calcareous degeneration and parenchymatous enlargements. The more common form is the latter enlargement, which is the type of uniform tumor seen in young people. It appears at about the age of sexual activity, and is characterized by an increase in the size and contents of the alveoli. In these cases there is also an increase in the solid elements of the gland. This type of goiter frequently, and we may say usually, responds to medical treatment. In many instances the colloid material is so abundant and the alveoli so large in the long-standing parenchymatous goiters that they are called colloid cystic goiters, and it often occurs that several of the various types may be represented in one tumor.

The conditions which have rendered operation imperative have usually been dyspnea, from compression of the trachea or its displacement, and from retrosternal enlargements. Dysphonia and dysphagia have been important symptoms at times, and in many instances

the weight and general nuisance of a large tumor as well as cosmetic reasons.

Acute infections often demand surgical intervention. More recently the symptoms of Graves' disease have placed exophthalmic goiter in this domain of surgery; whether properly or not is a matter still under discussion.

Riverdin, in an analysis of 3,408 cases, placed the mortality from total extirpation at 19 per cent.; from partial extirpation, at 3.5 per cent.; from intraglandular enucleation at 78/100 per cent.; from resection, at 6.6 per cent. Such statistics are but relative, however, as it is probable that the total extirpations were demanded for serious conditions and the intraglandular enucleations were presumably for the encapsulated adenomas. The deaths, when immediate, are from hemorrhage, air embolism, myocarditis, suffocation or the anesthetic. Later deaths are usually from pneumonia, from sepsis, tetany or myxedema.

Of the various methods of attacking thyroid enlargements, Mikulicz has developed the resection of a part of one or both lobes after ligating or compressing the arteries. Ostermayer crushes off a part of the gland and applies mass ligatures. Socin has developed the intraglandular enucleation. Kocher advanced the method of eventeration, or incision of cysts and shelling out their contents, and also the popularized common method of lateral extirpation in its capsule, dividing the isthmus and leaving a portion of the capsule at the side of the trachea to protect the recurrent laryngeal nerve, which he injured more or less in 7 per cent. of his first thousand cases. Paucet and Billroth made massive enucleation within the capsule.

Cysts have been treated by puncture, injection and drainage, but are now usually enucleated. Injections of various solutions into goiters are generally considered nearly as dangerous as radical operative measures,

and curiously enough, are more employed by the internist than by the surgeon, who always doubts the true position of the point of an instrument as soon as it is out of sight.

The displacement of a goiter by open incision, allowing it to granulate in the open wound, or exothyropexy, is seldom practiced. Incision of the isthmus for tracheal compression is sometimes employed as a temporary measure, but as a rule the relief is slow to manifest itself and the symptoms early recur. Ligation of three or four of the thyroid arteries is nearly as serious an operation as the removal of part of the gland. These cases seem to be exposed to all the risks, both primary and secondary, as if the gland were attacked directly. The removal of a part of the cervical sympathetic ganglion for the relief of exophthalmic goiter, as advocated by Edwards and popularized by Janesco, has had a fair degree of success. It is barely possible that the destruction of the lymphatic ducts efferent from the thyroid may account for some of the improvement noted. This theory will also explain the favorable reports following the exposure of exophthalmic goiter to the *x*-ray.

During the past fifteen years we have had a large number of parenchymatous goiters, which have been successfully treated, usually by some combined internal and external method. In the same period one hundred and ten patients have been subjected to operation for the relief of some type of thyroid tumor. Of these, thirty-four were for exophthalmic goiter, with six deaths. Two were for carcinoma of the thyroid, with one death on the third day from sudden collapsing of the trachea. The other, whose trachea was involved, required the permanent use of a long canula tracheal tube until death occurred fourteen months later. One case was a large lingual thyroid; two cases presented enlargements of the pyram-

idal lobe only, and these tumors were apparently separate from the remainder of the gland. The other cases, numbering seventy-one, with one death from pneumonia on the eighth day, presented the various types of adenoma and colloid cystic goiters. In two cases there were large areas of calcareous degeneration. One case was a large cyst with sixteen ounces of fluid, and apparently involved the entire gland. Two colloid cystic goiters were very large, one measuring twenty-two, the other nineteen inches across the tumor from one side of the neck to the other, and resting upon the sternum. In three cases the entire gland was apparently removed, but as this operation was by the enucleation method we considered it probable that there was some active gland tissue within the capsule or an accessory gland present, as there were no symptoms developed which could be attributed to the loss of the gland.

We prefer the Kocher collar incision as giving the most exposure and causing the least scar. This incision crosses the gland in the line of the creases of the neck and extends on one or possibly both sides as far as the posterior border of the sternomastoid muscle. In special cases more space is gained by splitting the lower flap in the center down to the upper border of the sternum. The sterno-hyoid and thyroid muscles can at times be retracted sufficiently to deliver the tumor or portion of the gland to be removed; but if they add any difficulties to the operation we have no hesitation in cutting a part or all of them and reuniting them by suture during the later steps of the operation. There is often some difficulty in determining which is the true capsule, and the incision can be deepened into the tumor until gland tissue or tumor tissue is exposed; the hemorrhage is inconsiderable if the larger vessels are avoided. Inspection of the tumor after its free exposure will indicate the best method of procedure in the operative technic of its removal. If the capsule is thick and

nearly the whole gland has disappeared into one rounded mass, we prefer the enucleation method of Soc.n, as in case of cysts they can be evacuated and the cyst wall removed, and if adenomas or large colloid cysts it is possible that enough gland material will be left to functionate should it be necessary to remove the whole mass. If, as is more often the case, the tumor upon exposure retains the general normal contour of the gland, we extirpate one lobe, usually the right, after the method of Kocher. In case of retrosternal enlargements it is delivered with this lobe if possible. The veins leaving the true capsule laterally are divided and the upper horn dislocated sufficiently to double ligate the superior thyroid artery and vein. The tumor is further dislocated and freed from below with dry gauze dissection until the inferior thyroid artery and veins can be ligated. The isthmus is now crushed with large forceps and ligated or closed by sutures after severing the tumor. If there is any difficulty in raising the lobe from the trachea and region of the recurrent laryngeal nerve, the capsule is incised under the lateral border and allowed to remain, the gland being cleansed from its surface. The wound is now closed by a subcuticular suture, and usually free drainage is employed by separate incision or by the vertical median incision above the sternum.

Exophthalmic goiters are extirpated in the same manner, using greater care in avoiding undue force or compression of the gland in its removal. Our usual rule is to give a hypodermic injection of one-sixth to one-fourth grain of morphia about twenty minutes before operation, as it quiets the general nervousness and aids anesthesia. Unless there is extreme dyspnea or extremely marked exophthalmic symptoms we prefer the drop method of ether anesthesia. In such cases we employ the cutaneous injection of cocain. This method is also used if we lack confidence in the anesthetist. The after-results have been perfect in colloid and adeno-

matous goiters, with the exception of one case of permanent hoarseness, and a few of this feature lasting but a short time. In operating for malignant disease we found the usual rule to hold good, that the operations were delayed, difficult, palliation short and mortality high.

The exophthalmic cases which recovered from the operation were all benefited within a period of three months,; about 50 per cent. became free from exophthalmic symptoms within from three to six months following the operation. In 25 per cent. the improvement was continuous during a year. In 25 per cent. the improvement was partial, the exophthalmus being slow to disappear. None were made worse who lived, and those in whom death occurred were the most severe types of Graves' disease, especially presenting tachycardia of from 130 to 150. Following the operations upon the thyroid gland, a condition of acute thyroidism is probable during the first twenty-four to forty-eight hours. To a great extent it depends upon the amount of traumatism in the operation. This condition is more noticeable in the exophthalmic cases. It is usually accompanied with from one to four degrees of temperature.

## DISCUSSION.

DR. J. W. BULLARD, Pawnee City, Neb.—I was somewhat disappointed in not hearing the essayist mention local anesthesia in these cases. I have had a limited experience in the operation for the removal of goiter. I have operated under local anesthesia, using the Schleich solution. In unilateral cases I use the angular incision of Kocher, beginning over the prominence of the sternomastoid muscle and carrying the incision over to the thyroid cartilage and then down to the sternum. In one case the recurrent laryngeal nerve was injured, though we had no idea that such was the case during the operation, which was a very difficult one and the isthmus heavy. The woman, who was a farmer's wife, has difficulty in calling the children when they are out in the yard. She can talk in the ordinary tone of voice,

but can not speak loudly. I think there is a great advantage in operating on these cases under local anesthesia when it can be done, as we have so much better control of the patient. In one of my cases the operation was of two hours' duration, but the patient complained of no pain except when the sutures were introduced. During the operation she asked me not to press so hard on the trachea as it interfered with her breathing, but it was not pressure but traction on the goiter. Immediately after the completion of the operation she got off the table, went through two rooms and the hall to her bedroom and called for tea, toast and a poached egg, as I had allowed her no breakfast, thinking a general anesthetic might be necessary. As I said before, there is a great advantage in operating on these cases under local anesthesia when it can be done. „

Dr. A. I. Bouffleur, Chicago—In regard to operating on these cases of goiter under local anesthesia, so far as my own experience goes, that is by far the preferable plan where there is marked dyspnea. I remember very well a patient who came down to Chicago from Northern Michigan. Patient had not slept for any considerable length of time (five, six, eight or ten minutes at a time) for more than a week. Examination of the larynx showed that the lumen of the trachea was nearly collapsed. By administering some morphin and whisky, with local anesthesia of the skin, we were able to do the primary part of the dissection without complaint. As soon as the pressure from the trachea was relieved, the patient went to sleep and slept in the sitting posture during the rest of the dissection. The growth in following the lines of extension followed the capsule far in behind the trachea, one extension passing posterior to the trachea and the other anterior, assisting in the narrowing of that structure. I have had three cases of goiter in men, all of them attended with some obstructive symptoms, but in the others the goiters were removed under general anesthesia without any difficulty. Kocher, or some of his assistants particularly, advises the use of local anesthesia on account of the surgeon being able to manipulate the recurrent laryngeal nerve. I was able to do this in my last case, but had a great deal of difficulty in waking the man up sufficiently to have him respond. It was undoubtedly of assistance to us in that case.

DR. M. L. HARRIS, Chicago—An operation for goiter may be extremely simple or one of the most difficult operations we are called on to perform. The size of the goiter is not always an indication of the severity of the operation. There are times when large goiters, the size of two fists, which project forward, may be removed very quickly and easily with practically no loss of blood. On the other hand, small goiters that develop backward or downward beneath the sternum are only removed with the greatest difficulty, and with considerable loss of blood. The hemorrhage in some of these cases is very alarming, indeed, and once or twice I have succeeded only with great difficulty in getting the patient off of the table alive.

There are a few points which are important in attempting to remove these growths. One of the most important of these is to respect the capsule and maintain it, at all times, when possible. By having control of the capsule we have control of the hemorrhage in our hands. If the capsule is lost, we may lose control of the hemorrhage. By having control of the capsule and being able to draw it up, we thereby compress a great deal of the blood supply and reduce the amount of hemorrhage. The next point is the avoidance of the posterior region of the gland. This, I think, should always be avoided when possible. I never attempt to remove the posterior region of the capsule, the region in which the inferior thyroid subdivides, and in which we find the recurrent laryngeal nerve. If we avoid this part we will never injure the nerve. I make it a point to ligate the vessels above and below before I attempt to enucleate. I pass a needle armed with catgut around the vessels in the capsule, including the artery and vein; then the capsule is opened and the enucleation is made. I do not drain these cases. In the place of draining I close the space entirely, suturing from side to side with catgut. This not only insures complete control of the hemorrhage, or oozing, but obviates the necessity for drainage. Great care should be taken to pass the sutures from side to side, not from before backward, because if the latter is done one may include the recurrent laryngeal nerve. To recapitulate: The two points which I consider of the greatest importance are the retention of the capsule and the avoidance of the posterior region of the gland.

DR. DONALD MACRAE, JR., Council Bluffs, Iowa—I

would like to ask Dr. Mayo if he has ever had any experience in regard to goiter in very young children or in the new-born? In this connection I would like to report a case of a baby three days old, in which I removed a goiter (the only portion which obstructed the breathing of the child) about the size of a good-sized hen's egg. I really did not know it was the thyroid until after I had cut into it and followed it over the isthmus, when I recognized it as a portion of the thyroid. This little baby was born gasping; it was apparently dying from the time it was born. The case occurred in the practice of Dr. J. C. Cole of Council Bluffs, who called me on the third day in consultation. We wrapped the baby up, carried it to the hospital and administered chloroform. Pressure was relieved at once and the infant had no untoward symptoms but made a perfect recovery. One interesting feature in connection with this case is that the father and mother both had goiters. There were also six other children in the family who had goiters, but in these the tumor did not appear until about the age of 10 or 15 years.

Dr. E. M. Sutton, Peoria, Ill.—I have been very much interested in this subject of the surgical treatment of goiter. My experience has been limited to five cases, one of which was particularly interesting, in that it was a retrosternal growth, giving rise to the distressing symptom of incessant coughing day and night, exhausting the patient completely. The patient was a lady, 35 years of age. This operation was done under cocain anesthesia, and the tumor was delivered from the retrosternal space. At this step the patient stopped coughing, and ether was administered by the drop method till the operation was ended. Of the other cases, one was operated under cocain anesthesia throughout. The first case, and the most difficult one, was operated under chloroform anesthesia throughout. In this case the pulse was 140, dyspnea great, tumor large. Others were under ether. Morphin, cocain by infiltration method, keeping the dose within safe limit, seems to me to act satisfactorily, except where we have extra dissection to do, as in case of malignant tumors.

Dr. Mayo (closing the discussion)—I have done twelve or fifteen operations for the removal of goiter under cocain anesthesia, but I do not like to do them unless I have great fear of the anesthetist. We have

very good anesthetists, and I confess, if I were compelled to do surgical work with some of the anesthetists I have seen, I would be doing many of these operations under cocain anesthesia. The question of drainage is important. In cases of colloid cysts and large cysts, the wound should not be closed without drainage. However, it is a matter of personal equation with the surgeon. In cases of exophthalmic goiter, where we desire to rid the system of the functional effects of the thyroid, with which it is overcharged, it is better to drain. In talking with Mikulicz, he told me that he drains in these cases. He covers the operative wound beneath the skin with excessive drainage to relieve the condition of thyroidism. We do not mind the thyroidism in the ordinary type of goiter, but we do in exophthalmic goiter. As to the other points brought out by Dr. Harris, I thoroughly agree with him as to the gravity of some cases and the importance of preservation of the capsule. With reference to the remarks of Dr. Macrea in regard to goiter in infants, Barry has reported a number of such cases. Some of them have a thyroid tumor; others have no thyroid, and yet some of the most typical cretins have small thyroid tumors. That brings up the function of the thyroid.

In studying the experimental work carried on by Dr. Crile in maintaining blood pressure with suprarenal gland, it brings up the question as to whether we have the internal blood pressure maintained in two ways: First, by the action of the nervous system; second, by some action on the blood itself. In the experimental work which he conducted extensively upon 300 dogs, I think, in blood-pressure work, he found a remarkable pressure was produced by the suprarenal gland extract added to the vein; that within a few seconds there was a rise of blood pressure, and that while it was fleeting, for a few minutes it doubles the blood pressure of the body. There is no drug known to-day which gives anything like the effect of the suprarenal gland. The action of the thyroid produces the opposite condition. In the thyroid action we have exophthalmic symptoms; low blood pressure; blood vessels dilated; the heart, in an effort to maintain blood pressure, increases materially its rapidity. There is but little pressure in front of it or behind it. I have been thinking over the subject a great deal recently in reference to some deaths we had

in thyroid work. With the continued use of suprarenal gland I was able to increase blood pressure from a pulseless condition and maintain life for thirty-six hours, but finally the patient died. There is practically nothing but the suprarenal gland which would bring about that condition. I believe the secretion of the thyroid and the suprarenal are opposed. If the theory as to the action of these two glands is right, they act differently from the nervous system, each having no ducts, and, like the ductless glands, they are dependent on the lymphatic system largely to deliver their secretions to the body. Organs like the liver, pancreas, kidney, having ducts, are under the influence of the nervous system.

# MEDIAN PERINEAL PROSTATECTOMY.

GEORGE E. GOODFELLOW, M.D.
SAN FRANCISCO.

We are to discuss to-day some methods of operative medicine for the relief of symptoms caused by a disease concerning which, in the entire field of medicine, none other has had so many and such diverse modes of treatment recommended, i. e., enlarged prostate. To do more would require time not at our disposal; however, a scant anatomical and physiological descriptive outline of the operative field seems requisite.

The prostate is usually described as a pear-shaped gland about the size of a horse-chestnut, with base directed upward toward the bladder, the apex downward and forward, with two lateral lobes and two commissures, the anterior joining the lateral lobes in front of, and the posterior—the lobulated portion of which is known as the third lobe—joining the lateral lobes behind the urethra. The first portion of the urethra with its musculature passes between the lobes of the prostate from base to apex behind the anterior commissure. The prostate is made up of muscular, glandular and connective tissue elements. The musculature is composed of a longitudinal layer from the urethra and from the circular layer of the bladder. The connective tissue of the gland spreads out to form the capsule. There is also a fascial sheath from the posterior layer of the triangular ligament surrounding the prostate which helps to form the pubo-prostatic ligament. To this has been given the name of prostatic capsule also. Anteriorly are the pubes;

below and behind are the margins of the levatores ani, the rectum and the ejaculatory ducts. Whether the prostate has a true capsule or not is disputed. Walker, in his monograph on Anatomy of the Prostate, seems to demonstrate that there is a capsule, and in the operations which I have had the good fortune to see made by others a capsule appeared to exist, but in all my operations I have been unable, not seeing the gland, to demonstrate conclusively to myself any such thing as a true capsule. The uses of the gland are uncertain, but are presumed to be connected with the sexual function, the secretion imparting motility to the spermatozoa. With the exception of malignant growths, enlargements of the prostate are usually physiological until they become pathological by obstructing the flow of urine. The causes ascribed for the enlargement are many, but none are satisfactory. The mechanism of the obstruction is now being studied; that is to say, the manner in which the prostate interrupts the flow of the urine. Presumably it does so by elevation of the vesical outlet and limiting vesical movement.

From time immemorial the prostate gland has been the seat of various ailments, the symptoms of which have been of more than passing interest, not alone to those afflicted therewith, but to those members of the "healing art" whose good or bad fortune it has been to treat them. Hippocrates says: "And when the belly is not hot nor the neck of the bladder very much contracted, all such persons pass water freely and no concretions form in the bladder; but those in whom the belly is hot, the bladder must be in the same condition, and when preternaturally heated, its neck becomes inflamed; and when these things happen the bladder does not expel the urine." The difficulty of urinating in the old (men) is also noted in various others of the early writers, and remedies suggested. Not until the past decade, however, have adequate remedial measures been devised; at least none that could offer more than the usual prob-

lematical results of all serious surgical operations The catheter, with all the sufferings attendant, seemed to be the only means for producing euthanasia. Gradually, however, out of the chaos of operative methods recommended has been evolved a procedure which may be relied upon as essentially curative in almost every case, at least should have no mortality as a result of the operation, i. e., removal of the gland through the perineum. The earliest modern mention known to me of the removal of the prostate per perineum is by the late Sir William Ferguson, who, in cutting for stone, said that he removed unintentionally the lower part of the prostate as readily as if it had been a stone. The patient not only recovered from the operation, but never afterward showed any signs of prostatic irritation.

Mr. Cadge reported a case where, during a lithotomy, he removed in the forceps between the joints of the blades, with no after complications, three masses which were found to be fibrous outgrowths of the prostate. Dr. C. Williams also mentions a case where he accidentally extirpated, between the forceps, an enlarged middle lobe of the prostate. In three weeks the patient was reported as recovered, seldom urinating more than once in the night. In all probability these cases were complete removals.

Following these inadvertent and unpremeditated partial or complete extirpations of the prostate numerous methods have been advised and practiced, chief among them being suprapubic and perineal section, respectively; the two combined; castration, single or double; vasectomy; puncture per rectum and through perineum; internal incision with divulsion, and division with electric knives. Systematic suprapubic prostatectomy was performed by Belfield and McGill in 1887; a perineal operation on the prostate was made by von Dittel in 1889, he removing a wedge-shaped portion from the under surface of one or both lateral lobes, through an incision extending from the median raphe round the sphincter

and to the tip of the coccyx, the urethra and bladder being left intact. Nicoll, in 1894, made a combined suprapubic and perineal cystotomy, removing the prostate through the perineum. Alexander, about the same time, made a similar operation differing in slight details. About this time E. Fuller modified the McGill operation, as did also Keyes, who opened the membranous portion of the urethra and drained through the perineum. Division of a median obstruction of the gland was performed by Bottini by means of the galvano-cautery introduced through the urethra, or through a perineal urethrotomy as done by Wishard.

At the fifty-third annual meeting of the British Medical Association, in 1885, Reginald Harrison recommended the perineal route for exploration and incidental removal of tumors of the bladder. The perineal work which has been done during the past few years by various surgeons is familiar to all of you and I shall not delay by detailing it, as some of those gentlemen are present to speak for themselves. During the latter '80s I operated suprapubically and had what could be called good results, but the outcome—as I presume was the experience of most of those who adopted that method—not satisfactory.

In 1891 I made a pure perineal prostatectomy, the first, so far as known to me, deliberately devised and carried out. Having in my student days and early professional life seen, assisted in, and made a considerable number of perineal stone operations, the technic followed was simply that of a median lithotomy, the steps of which, I presume, are unnecessary to detail, although to make clear the method followed I shall outline them. If required, a few days before the operation, urotropin in seven or ten grain doses are given twice or three times daily. No preliminary irrigation of the bladder is made. The usual pre-operative procedures are carried out, thorough cleansing, external and internal, the rectum being emptied by an enema a few hours before the

operation. With the patient in the ordinary lithotomy position, the legs held by assistants, the bladder being empty or full, as the case may be, a lithotomy staff is introduced, the legs then elevated somewhat, a median incision from the base of the scrotum to the margin of the anus is made, and carried to the membranous urethra, which is entered with a straight lithotomy knife and the opening extended *into* the bladder. The finger is then introduced *into* the bladder, the staff removed, and the moderate flexion of the legs and thighs on the abdomen and the thorax increased to as great an extent as possible; then with the opposing hand over the hypogastrium the bladder is depressed, and the enucleation, beginning at the beak of the prostate below and working upward next to the bladder, or from above on either side downward, is carried on, the time consumed for complete enucleation rarely being over five or ten minutes, the resulting hemorrhage being virtually nothing. The gland may be removed entirely or lobe by lobe. If the bladder has been full of pus sometimes it is washed out. No drainage of any kind, gauze, tube or catheter, is made, the perineal incision sufficing. In my earlier cases the practice was to pass a straight sound through the perineal wound into the bladder every other day for a week or more to keep free drainage, and in any complicated cases such course might still be adapted; but of late it has not been found needful. In all recent cases no instrumentation of any kind has been permitted, neither irrigation (except at time of operation), passage of sounds nor catheters; and all have done as well or better than under the older process. The patients are allowed to get up as soon as they feel like so doing, and the urethra is generally closed within eighteen to twenty-four days. Frequently some urine passes naturally within forty-eight to seventy-two hours, the quantity increasing as the wound closes, until all is voided by the urethra. What becomes of the prostatic urethra? has been asked. The answer is that part or all is removed

with the gland, an incident that in no manner seems to affect the restoration or continuity of the urethra, nor the power of the bladder to retain and control its functions; nor is stricture nor occlusion caused. The seminal ducts are not ligated, for this seems to me an irrational refinement, especially as many of my patients have (so they say), to a greater or less extent regained sexual vigor.

The points to be expressly emphasized are the position and the incision *into* the bladder. Upon these, in my opinion, rests the unvarying success. The former gives access to the gland and bladder, while the latter permits rapid ablation of the gland, also the viscus to be thoroughly explored with the finger or through the speculum, as could be the vagina in like position; and, obviously of equal importance, complete drainage is established with less traumatism than in other methods. In none of my operations have retractors, speculæ or other instruments been required to enable me to remove the gland, the finger serving all needs. I do not find it necessary now to use the knife to enter the urethra and bladder. After cutting to the urethra I am able with the finger to open the urethra and get into the bladder by a boring movement. Then not having a cut through the commissure, I enucleate from above instead of from below as formerly. The method, however, is immaterial, although with the more recent plan a much smaller incision is made, one which will admit only the index finger.

With the foregoing ends the description of the operation devised and practiced by me for thirteen years.

Now should be discussed various matters of interest connected with the subject. Indications and contraindications for operation. Accidents and complications, perforation of the rectum and hemorrhage. Sequellæ: Delayed healing or fistulæ; incontinence, temporary and permanent; epididymitis; impotence; mortality and ultimate results. I shall only speak of indications for

operation and mortality, leaving reference to the balance for another time. The indications for operation are symptoms of obstruction with concomitant sufferings. There are no contraindications to operation unless the condition of the patient is such that no operation of any kind is warranted. Among the seventy-three patients operated upon by me there have been two deaths directly following the operation and probably justly attributable thereto: One from sepsis after eleven days, the other after seven hours. The first was a man of 73 or 74 years of age, afflicted for several years with bladder troubles necessitating the constant use of the catheter. The urethra finally becoming both impassable and impermeable, he was aspirated suprapubically two or three times daily for a week or more, then consented to radical operation. Slight temperature existed, but otherwise there seemed to be no serious contraindications to the operation; in fact, none. No accident of any kind occurred in the removal of a large gland. I did not see the patient for ten days, when I found him dying from sepsis.

The second was a man of 70, who had been suffering for years in a manner similar to the first. He had been in hospital for several months, had had a perineal section and was septic, his temperature ranging from 100 to 102. At the time of operation he was feeble, joints somewhat painful; but his sufferings were such and death so comparatively near, it seemed judicious to make a strong effort to alleviate his distress, if not to save his life, so the prostate was removed. He left the table in good condition, and I left him about an hour after the operation. Owing to the condition of the bladder, contrary to my custom, a drainage tube had been inserted. About three hours later, summoned in haste, I found him in a collapsed condition. There had been free oozing, but no more than I had seen in many cases; no quantity that could to me account for his then state. Pulse rapid, almost imperceptible, gasping for breath, dilated pupils, skin clammy, etc. In spite of transfus-

ions, stimulants, etc., he died some three or four hours later. Reasoning upon the cause of death has aided little in solving the mystery. While he might not have ultimately recovered, in my opinion he should have had a little or no difficulty in passing the immediate effects of the operative traumatism.

Both of these individuals were operated upon since June, 1903.

NOTE.—Urotropin, of course, is a recent drug. In 1891 and as late as 1899 I irrigated the bladder, but since have ceased almost entirely so to do.

# COMPLICATIONS AND SEQUELS OF PROSTATECTOMY.

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At the present time no single operator has had sufficient experience to enable him to speak authoritatively upon this subject, and such extremes of experience have been reported that it is difficult to estimate the real dangers and difficulties of prostatectomy. Dr. Goodfellow, in a paper upon Perineal Prostatectomy, read before the California Academy of Medicine, April 29, 1902, says: "We can confidently say to sufferers from the troubles incident to hypertrophied prostate that a cure is absolutely certain, the danger practically *nil*." On the other hand, Dr. Chetwood,[1] says: "No thoughtful surgeon will declare that the mortality rate of prostatectomy is trivial."

Prostatectomy, involving as it does such important anatomical structures, and being performed as it often must be under such adverse conditions, is a capital operation, and no capital operation is without a death rate, serious complications and sequels. With our improved technic the mortality is not high, the complications and sequels are constantly growing fewer, but they must necessarily exist, and it is only by faithfully noting and reporting them that we can hope to reduce them to the minimum. It is altogether too grave an operation to be resorted to as a routine treatment for every

1. Medical News of Aug. 8, 1903.

enlarged prostate, and is applicable only to properly selected cases. There will always be a place for palliative measures in neglected cases of prostatic enlargement. It is not wise to say that after a certain age a man is not a fit subject for this operation, because the number of years he has lived is not a proper index to his surgical age. As long as a man's heart, arteries and kidneys are in fit condition to allow the administration of an anesthetic, he is a fit subject for surgery.

The most frequent cause of death following this operation is uremia, consequently the most important preliminary examinations are those of the kidneys. Unfortunately, the enlarged prostate and inflamed bladder make it a difficult matter to ascertain the exact condition of the kidneys, but after the usual microscopic and chemical examinations of the urine made by a competent person, we are warranted in operating so long as there is no positive evidence of serious kidney involvement. In the presence of such evidence the operation is contraindicated, and we must be content under these conditions to resort to palliative measures only. The modern practice of administering water and urotropin freely for a few days preceding and following operation undoubtedly carries some patients from the border line to the safe side. The next greatest danger is sepsis, and in the presence of an infected bladder it is an ever present one. These old men will bear up under an operation almost as well as younger ones so long as wound infection does not take place, but they have very much less resisting power against sepsis. It is impossible to disinfect a thickened, badly infected bladder before operation, so our only hope lies in thoroughly cleansing the wound and providing for free drainage.

The complicating cystitis is often at the present time the most positive indication for operation, and it is for the relief of this complication that the various palliative measures are most frequently employed. Our only means of preventing cystitis as a complication is to get prosta-

tectomy so well established that it will be the accepted method of treatment when catheter life would otherwise begin. The only satisfactory treatment for this complication is drainage, and this is best brought about by perineal prostatectomy.

Stone is a frequent complication of enlarged prostate and should always be sought for and removed during the operation. Cases are on record in which a stone has been overlooked, and as a consequence the operation was a failure. This might very readily happen in the perineal operation unless the operator made a deliberate search for stone.

The incision for a prostatectomy, when too extensive, causes various complications. In the upper operation it may injure the peritoneum; and in the lower one important muscles, blood vessels and nerves are unnecessarily injured by an extensive cut. The peritoneum is ordinarily easy to avoid, but with a contracted bladder the danger of injury to this membrane is great. In the perineal operation the tendency is to employ the straight median incision, because it certainly does the least injury, and because those who have employed it find that a more extensive incision is unnecessary. On the contrary, those who have employed the larger incisions have learned that they are not necessary and that they do cause unnecessary complications. Beginners are prone to cut too much because they think it makes the operation easier and because they have not been properly warned against the complications arising therefrom.

Hemorrhage is an occasional complication, but its dangers have doubtless been overestimated. The writer has had no serious hemorrhage complicating the perineal operation, but has had some anxious hours from this trouble in the suprapubic operation. The median perineal incision certainly reduces this danger to the minimum. It is always better to control the hemorrhage by ligature or forcipressure when practical, rather than resort to packing, for packing firm enough to control

the hemorrhage causes severe pain and may cause sloughing.

Too little effort is made to protect the urethra in the perineal operation. It simplifies the operation wonderfully to sacrifice the whole prostatic urethra as is frequently done, and it is marvelous how quickly nature compensates for its loss, but it is not reasonable to expect that there will not be traumatic stricture later. We all know what a serious matter a traumatism to other portions of the urethra often proves to be, and there is no reason why the same will not prove true of this part. Within the next few years we will all see patients suffering from this cause who are now listed among the cured. This operation is a mutilating one at best, and it is our duty to be as conservative as possible. The destruction of a certain part of the lower wall of the urethra is unavoidable, but the upper and side walls can and should be preserved. We must not try to develop a grand stand operation which yields brilliant results for a time only to be followed by disappointment later, but rather a conservative operation which cures, so that the patient can live out his expectancy in comfort. A man with a traumatic stricture at the neck of his bladder may be in a worse condition than one with an enlarged prostate. One of the serious objections to the suprapubic operation is the extensive injury done to the bladder. With proper care extensive injury to this organ can be avoided in the perineal operation. The writer has repeatedly demonstrated on the living and the dead subject that in a case suitable to this operation the gland can be enucleated without serious injury to the bladder. The muscular fibers of the bladder are continuous with those of the gland, but there is always a distinct layer of bladder fibers which are independent and to the inner side of the gland. Over the third lobe it is often quite thin and requires great care for its preservation. When the bladder is torn the wound should be closed with catgut.

The most difficult problem in the perineal operation is how to avoid injury to the rectum. There are very few if any operators who have never met with this accident. It is not a disastrous event when it does happen, but is always a serious complication. The rectum may be torn through, or it may be so injured that it will slough through after a few days. In order to avoid this accident it is necessary to follow the urethra closely back to the apex of the gland, then open and keep well within the capsule. None but an experienced and trustworthy assistant should be allowed to hold the retractor on the rectal side, for it is a very easy matter to push the instrument through the bowel. When the accident does occur the opening should be closed with stitches to the rectal side backed up by catgut on the perineal side. When the opening is small a purse string will suffice.

Can we preserve the seminal ducts? It is certain that with our present technic we do not preserve them, and in the case of a virile man this is surely a very grave complication. As this operation becomes better established we will operate earlier and necessarily upon younger men, when this will become a serious question. Young, of Baltimore, has reported to the American Association of Genito-Urinary Surgeons a technic by which he claims to be able to preserve these ducts, and this is certainly a necessary step if we hope to establish the early operation for prostatic enlargement. For a comparatively young man impotence is certainly the most serious sequel of prostatectomy, and one to which we must give careful consideration. With our present technic, which destroys the ducts, it is doubtful if any man has the power of procreation after a prostatectomy, and some lose the power of copulation. The prostate is undoubtedly a generative organ, but whether it is an indispensable one remains to be demonstrated. It seems rational to believe that interference with blood and nerve supply by a too liberal perineal incision may be a cause

of impotence. This possibility certainly affords food for reflection.

An occasional sequel of prostatectomy is incontinence or dribbling. This is due either to injury to muscles and nerves, or to the neck of the bladder, most frequently the latter. This condition should rarely obtain because by proper care and conservatism it can be avoided. A careless or inexperienced operator may very easily tear away that portion of the sphincter of the bladder just below the urethra and in front of the third lobe, which would be very liable to be followed by incontinence. The perineal wound is usually closed inside of three weeks, but a perineal fistula will occasionally remain. This may be caused by too protracted draining. It is rarely necessary to leave a tube in the bladder for more than a week and it may often be removed earlier to advantage. This delay in the closure of the wound may be due to the fact that the operator did not properly close the cavity left by the removal of the gland. The lateral walls should be carefully approximated by buried catgut sutures, as we do in operations upon the female perineum, so that there remains but a channel for the drainage tube to pass from the bladder to the outside. Later, when we learn to operate upon prostates before the bladders are infected, we may be able to close the perineal wound completely, draining through the urethra only. It is a mistake to fill a large space in the perineum with gauze, because it delays union and leads to complications and sequels. When a fistula shows a tendency to become chronic it can be cured by a plastic operation followed by a catheter in the bladder for a few days. A communication between the urethra and the rectum is one of the sequels met with occasionally. The writer operated upon one such case successfully by dissecting up through the perineum, closing the openings in the urethra and bowel with fine chromic gut, and leaving a gauze drain between these two points extending out through the perineum. By leaving the gauze

between the two points repaired it was hoped that if one fistula did fail to close at once the other might heal, and this was just what did happen, nature finally completing the cure without further assistance. Epididymitis is quite a common sequel to prostatectomy, sometimes becoming so troublesome as to require the removal of the epididymus. It may be caused or aggravated by the injudicious use of sounds, and should always be remembered as a possibility when they are employed.

Because the writer has dwelt briefly upon possible as well as probable complications and sequels of prostatectomy, he does not wish to be classed as a pessimist. The true optimist is one who recognizes difficulties with the hope of overcoming them. In order to place this operation on a proper footing it is necessary to recognize the fact that it is not the bed of roses some of our over-enthusiastic brethren who have operated upon a few cases successfully would have us believe. Some failures are bound to follow this important operation, as they do every operation of like magnitude, but notwithstanding this fact it is destined to be one of the greatest boons modern surgery has to offer suffering mankind.

## DISCUSSION

### ON THE PAPERS OF DRS. GOODFELLOW AND MOORE.

DR. CHAS H. MAYO, Rochester, Minn.—In view of the fact that Dr. Murphy is not present, and knowing that our honored President is a well-known authority and representative in this line of work, I am sure the members of the Association would be glad to hear from Dr. Ferguson.

DR. ALEXANDER HUGH FERGUSON, Chicago—I wish to congratulate Dr. Goodfellow on his remarkable success in so many cases of prostatectomy for hypertrophy of the prostate. I had thirty-one cases of prostatectomy without a death, without complications, without sequelæ, and I said to myself, this is easy work. The next case I operated on died; the next case died, after which I had two or three successful cases, then a death, and two or three successful cases again. I had four

deaths in less than forty cases. Of this number only one can be said to have died from the operation *per se*. Perhaps that is hardly a fair way to put it. If I had not operated on them they would not have died within a few days. Two of these deaths occurred in Milwaukee. One of the patients was bedridden, and I practically refused to operate on him on account of his condition. I told him that it would be largely an experiment. He was only passing seven ounces of urine a day. We had him prepared for a week in the following way: We gave him salt solution every six hours hypodermically regularly for a week, so as to increase the secretion of urine, to fill up his arteries, and to get him in a better condition to withstand the operation. Along with this strychnia was given three times a day, to the extent of one-thirtieth of a grain. By these measures we increased the amount of urine to thirty ounces. He stood the operation well, but on the second day he began to sink, although he was secreting as much urine as he had been previously, before we began to prepare him for operation. The man was too weak really to withstand any operation. Death occurred on the third day following the operation. He had no sepsis; no uremia. Death from exhaustion.

The other death likewise occurred in Milwaukee, but I have been unable to satisfy myself why that patient should have died. He was a comparatively young man, under fifty years of age, and in good condition for the operation. His kidneys were not involved. He was passing forty to fifty ounces of urine in twenty-four hours. He had no arteriosclerosis. He was in much better condition than a number of gentlemen over eighty years of age that I had previously operated on. But this man I refer to died apparently from general weakness.

DR. GRANT—How long after the operation?

DR. FERGUSON—It was two days. The other two deaths occurred at the Chicago Hospital. They were better subjects for operation than a number of others I had operated upon. One of them died from peritonitis. Both bladder and prostate were septic, and at the operation my finger went through between the bladder and the rectum into the peritoneal cavity. That has happened to me twice. The other patient got well.

My next case lingered on with a low form of sepsis, with tenderness over the kidneys, and died at the end of two weeks after the operation. We could not get a postmortem examination, but we feel reasonably certain that death was due to renal sepsis.

I am not going to talk about the good results of this operation, as they speak for themselves, but I wish to say a few words with reference to the bad results. I have had epididymitis in six or seven of my cases. I have been using instrumentation. The bladder has been washed out, and it appeared to do great good. The practice of passing a bougie at the end of a week or ten days is a good one. It opens up the urethra and urine escapes by the natural passage sooner than if this was not done. At the risk of a slight epididymitis, I think I would still continue this practice. Epididymitis, however, occurs later, in two or three or four, or, as in one of my cases, six weeks after the operation. I do not think instrumentation has much to do with it. It is undoubtedly caused by an ascending inflammation from the ejaculatory ducts.

I have had a perineal fistula in two or three cases, all of them having closed but one. In this case the fistula closes occasionally, but opens up again. This was in the case of a physician who had a septic bladder and four stones imbedded; I think the perineal fistula was due to the sepsis in his bladder.

The next point I wish to consider is stricture at the neck of the bladder. I removed a very large prostate from a man seventy-two years of age. I should say that his prostate was fully the size of the tumbler I show you (referring to tumbler). He made a beautiful recovery; he was out and about in three weeks, with the perineum closed, and passing urine in the natural way. Six weeks after the operation it was found that he could not pass his urine on account of some obstruction. I used local anesthesia, and made a straight perineal section. I could not introduce any instrument into the bladder, there being a stricture at the neck. The perineal section cured him.

In another case there is partial stricture which I am bougieing twice a week. He is a man 45 years of age, strong and robust. A surgeon in Chicago removed his prostate, shortly after which he went to Europe. The patient came to me because he was not doing well.

I found the pathologic lobe still within the bladder and removed it. I recall a case of incontinence that continued intermittently for a year after the operation.

In another case, a healthy man, 46 years of age, whose prostate I removed, there was both impotence and slight dribbling. He has not got to wear a urinal. However, when he overexerts himself he is liable to wet himself a little. Some of these cases become impotent after operation, others do not. It is a delicate question to ask some of these men whether they are impotent or not. The complication of stone in the bladder I have encountered six times. I have had one case of cancer of the prostate and it was inoperable.

Injury to the rectum occurred once after operation. This was the case of an old soldier upon whom I operated at Quincy, Ill. A slough occurred afterwards, and he had a urethro-rectal fistula. He appeared to be quite comfortable with it; the perineum closed itself.

I have had reports from some surgeons who say that they tore into the rectum with the first retractors I recommended. Since then I have discarded those retractors. I now use retractors that are smooth at the end.

With regard to the complication of hemorrhage during the operation, I have had two cases. In conversation with Dr. Goodfellow, he told me that he never used drainage in the bladder and never used gauze, and his cases progressed smoothly and favorably. The next case in which I removed the prostate I did not introduce any drainage and the parts came together nicely; but the patient's bladder filled up with clots. I had to put him on the operating table in about twelve or thirteen hours, and remove the clots from the man's bladder, using a scoop to do it. I thought this might not happen again, but it did in the next case. We detected it earlier and drained the bladder before the blood had time to coagulate to any extent. I think it is good practice always to drain the bladder, and for this purpose a rubber tube is as good as anything. It is good practice to pack where the prostate was, because there is surely a cavity, and if you do not fill that cavity with gauze, it will fill with blood, serum or something worse. Gauze will check the oozing of blood, and prevent it from going back into the bladder and causing the trouble I had in two of the cases mentioned.

Prostatectomy is not as roseate an operation as we have thought, after all. Of course, we get cases in which we can introduce the index finger and turn out both the lateral and median lobes inside of seven minutes. In others we may have to work an hour or two hours before we have satisfied ourselves of having done thorough surgical work.

I have paid some attention to the capsule and tried to work inside of it. There is a fibrous capsule around the lateral lobes and posteriorly; you can cut through it, introduce your finger within it, and know your finger is there just as I know that my finger is on the other side of that paper (indicating). The central lobe is pathologic; it is covered by mucous membrane. I do not know whether it is covered by the same fibrous material or not. I am inclined to think not. I use the median incision and like to make it large enough to enable me to see what I am doing as well as feel.

I have consumed more time than has been allotted to me, and I wish to thank you for giving me this opportunity to speak to you on this subject.

Dr. C. E. Ruth—In removing the pathologic third lobe, do you remove it through an incision through the mucous membrane of the bladder or enucleate it underneath?

Dr. Ferguson—I have done it both ways. Sometimes you can pass the finger behind the prostate and remove it from behind, leaving the mucous membrane of the bladder intact. At other times, when the middle lobe is like a polypus, with a pedunculated attachment, then it is better to introduce the middle finger into the bladder, feel it, and with a prostatectomy forceps turn it out of the bladder into the perineum, when, of course, the mucous membrane covering it is removed as well.

Dr. Charles A. Powers, Denver, Colo.—I have taken the deepest interest in listening to what has been said in regard to this subject. Dr. Goodfellow's paper is a remarkable one. I hope, in closing the discussion, he will speak to us a little more at length as to the ultimate results. If I understood him correctly, he said that in every instance the ultimate result had been perfect.

Dr. John P. Lord, Omaha, Nebr.—I would like to ask Dr. Goodfellow to be a little more specific on some points. First, the usual period of primary inconti-

nence; second, the number of cases he had of permanent incontinence.

The question arises in the minds of a number of us, from the description of his operation, with the considerable destruction of urethra which takes place during his operation (which he does not seem to regard as any particular objection), whether permanent incontinence may not result in a considerable number of cases, or the possibility of other conditions occurring such as have been referred to by Dr Ferguson, particularly the condition of the stricture. I would like to have Dr. Goodfellow enlighten us more fully on those points.

Dr. Moore mentioned the suturing of cavities from which enlarged prostates are removed. I can conceive of this being done without a great deal of danger in many of the cases, particularly the younger men, who, in the earlier stages of their disease, have not the element of sepsis; but it occurs to me that any considerable suturing in this locality would invite sepsis, and is a practice which we should not resort to.

Dr. Archibald MacLaren, St. Paul, Minn.—In a small experience of some fifteen cases I have seen but one instance in which the entire prostatic urethra was removed. In this case a suprapubic prostatectomy was done; the prostate was comparatively small, and even with the eye and very careful dissection the prostatic urethra was removed entirely with the prostate. It is the only case of complete incontinence that I have seen in these fifteen prostatectomies.

As to opening into the rectum, I have seen that accident happen once. It was not one of my own cases. The opening eventually closed by granulation, without any other operative procedure.

As to perineal fistulæ, which was referred to by Dr. Ferguson, I have seen two such cases.

In two such cases as Dr. Ferguson has described, there were stones in the bladder at the time, and in both small stones were later found in the prostatic urethra, or they had re-formed in the bladder, and it is marvellous how quickly they will re-form. I recall the case of an old physician in whose bladder four stones were found and removed at the time of the prostatectomy. He made a rapid recovery, went home, and in five or six weeks thereafter his distress returned again; the fistula reopened; there was considerable pain and

discomfort; but the crushing of a small stone relieved him entirely, and only a few days ago I heard that he was quite well.

I have seen cancer of the prostate once, and it is a very disagreeable condition to me. It bleeds very profusely, and the disease soon returns after operation. There is absolutely no benefit to be derived from operation on such cases. The only death I have had was in the case of an old man who had a double pyonephrosis, and who died on the second day from sepsis.

Dr. William Jepson, Sioux City, Iowa—I shall not take up the time of the Society in discussing this subject, although it is one of great interest to all of us. I wish to say, however, that the chapter as to its pathology and treatment has not yet been closed.

In the first place, in considering the pathology, we must remember the fact that the prostate, as primarily developed, has two lobes which are united, and that the prostatic urethra courses between these two lobes at about a third of the distance posterior to the anterior margin. As these enlarge, either through an increase of muscular fibers or through the development of adenoid structure in the accompanying tubules which we have here, the prostate in enlarging is prevented from descending downward because of the fact that it is within one-quarter of an inch of the posterior layer of the triangular ligament. It expands laterally, being restricted by the levator ani, and finds its way up into the bladder. If the prostate is enlarged, it leads to a cone-shaped projection in the bladder, and if the lower portion of the posterior part of the lateral lobes is enlarged, it pulls up the mucous membrane and causes a bar. I must admit I do not see how it is possible for any individual to remove the prostate without removing every bit of the prostatic urethra. I have a couple of specimens that I would like to show for the purpose of having the question explained to me as to how it is possible to remove the prostate without removing the prostatic urethra. We recognize very well that we may have enlarged prostates which may lead to obstruction to the outflow of urine, and this is a serious consequence. On the other hand, a very small projection of the enlarged prostate which interferes with the outflow of urine may lead to serious obstruction.

Coming to the matter of treatment, there is no ra-

tional plan aside from that of prostatectomy, and while we have had from Dr. Goodfellow most excellent reports, and his results are certainly better than those obtained by any other man in this particular line of work, yet we find from the papers presented by others that the same procedure has not been followed by the same beneficial results.

I recognize that there are two ways of removing the prostate—one through the perineum, the other through the bladder. For my own part, I have tried perineal prostatectomy, and it has not been in my hands that rosy, successful procedure I would like it to be. When I listened to Dr. Goodfelow's paper as to the facility with which he enucleates the prostate without instruments, I immediately thought of the length of his finger, and he has fortunately a very long finger, which will permit of the easy enucleation of the prostate apparently, a thing that is not possible in my own case with my finger. I believe that suprapubic enucleation of the prostate will be found ultimately to be followed by equally as good results as by the perineal method, and, in fact, if we compare the results now, they are certainly equally as good. A surgeon at a recent meeting of the British Surgical Association, reported fifty-six cases, with one death. Pryor has reported a large number of cases treated in a similar manner. I use the suprapubic route entirely now, although I do not wish to condemn the perineal route, because in the hands of many surgeons, probably the majority of them, it would be the better method. But I think there are very few procedures in surgery—at least, that is the conclusion I have arrived at—more simple than that of enucleation of the prostate through the bladder. This procedure produces as little traumatism to the tissues as possible. The dangers of epididymitis and other conditions occurring which have been mentioned, are obviated. I say this for the reason that I think in time it will be the operative procedure which will be employed.

In conclusion, I wish to say that I think the operation which will ultimately be looked upon with greatest favor will be the one that can be done the most rapidly, with the least amount of damage to tissue, and consequently leaving the patient in as nearly a normal condition after the operation as possible, and I believe the suprapubic operation will do that as well as any.

DR. D. S. FAIRCHILD, Des Moines, Iowa—About twelve years ago I had occasion to remove a prostate, by the perineal route, of a railroad conductor, who had sustained an accident. The gland was considerably damaged. The man had recently married, and now has a family of children. Although it was supposed that the entire gland was destroyed, I removed, from time to time, the prostate through the perineal route, and I supposed that this was the right thing to do. I did not hear much said about this method of operating, but it seemed a comparatively easy matter, and in doing it I followed the directions which Dr. Goodfellow has described, and continued to suppose that it was the best way of treating these cases until the suprapubic route was introduced. When suprapubic prostatectomy was brought before the profession and considered the best operation to do, I began to try it. I found there was something about it which made it impossible for me to get the desired results, and I remember very well within two years, after making a suprapubic prostatectomy, I was obliged later on to remove the prostate by the perineal route. A few years ago I had some information to the effect that this was not the best way of getting at it, because it did not give room enough, and I had the opportunity of seeing a Chicago friend do this operation through a much larger incision. I employed that once, and the patient died from uremia. This operation has seemed to me one of the most satisfactory operations that I do.

I have not met with the unfortunate results that have been described by Dr. Moore. I have no doubt they occur, but cases of that kind have not come to my notice. In some cases where there has been an old inflammatory process, with firm and dense adhesions, it requires some violence to remove the prostate, but where these adhesions have not taken place, you can remove the prostate with ease. I have used lately Young's retractor, which seems to me to be a very useful instrument in bringing down the prostate so as to bring it within easier reach. I had supposed that a drainage tube was the proper thing to employ in all cases until this summer, when a case came under my observation where the prostate was removed and a tube introduced. The patient pulled it out that night, and it remained out, and that patient did just as well as any of the other

cases I have treated. I am inclined to Dr. Goodfellow's view that a drainage tube is not essential to the treatment of these cases. However, Dr. Ferguson has given a very good reason for its employment, namely, that it lessens the danger of hemorrhage, and putting in a tube and packing gauze, thereby lessening the amount of hemorrhage, is an argument that has appealed to me strongly, and while I think I shall treat cases in the future without drainage, yet I shall have some apprehension that the same accident will occur to me that occurred to Dr. Ferguson in these cases. Tearing into the rectum would be a difficult thing to do if a man was reasonably careful. Of course, the organs are close together, and we have to do the work largely in the dark by the aid of the finger, or, at least, we have to determine the condition by the sense of touch. But it is hardly possible to do such a thing if the work is done deliberately and carefully. I do not think these cases should be operated upon by the watch; plenty of time should be taken, and the parts should be handled carefully, because ten or fifteen minutes more will make but little difference in a proper case for operation.

DR. DONALD MACRAE, JR., Council Bluffs, Iowa—With reference to the remarks of Dr. Moore as to the non-necessity of damaging the rectum, if I understood him correctly, they are liable to put a damper on some of us who expose ourselves to the criticisms of others. It seems to me, in this Association we should get up and tell of our mistakes as well as our successes.

I have had two cases of perineal fistula complicated with rectal fistula. One case I would hardly call a urethro-rectal fistula, but rather a vesico-rectal fistula. This was an old soldier who had a rectal operation performed several years previously, resulting in partial incontinence of the rectum when I saw him. I removed his prostate; it was the easiest operation I had ever performed. The prostate peeled out like an orange out of its skin. But within a week the urine began to dribble through the rectum and continued to do so, and I had a most unfortunate condition. I did as Dr. Moore advised in his case, namely, reopened the perineum and turned the rectum in the best I could. It is difficult sometimes after an operation of that kind, as there is a great deal of scar tissue and change about the opening which makes it hard to hold thoroughly. I turned the rectum and

bladder in and put in a little drainage. Unfortunately I did not do it correctly; at any rate, a recurrence of the fistulæ followed soon after. Later I did a suprapubic, making an opening in the bladder above, thinking that by carrying a large quantity of urine through that direction and through the penis, I might allow nature to close the other opening. No urine came through the rectum at the end of two weeks. I pulled out the tubes and catheter within a few days; but the patient is walking around now wearing a pad, with dribbling from the perineum and also from the rectum. As I have said, I believe this is the place for us to report our unfortunate cases.

In another case I had a similar condition to that described by Dr. Ferguson, of an opening between either the neck of the bladder or the urethra and rectum. In this case the man retains his urine, but passes it per rectum every few hours. More or less urine comes through the penis naturally, but the greater part of the urine passes through the rectum. The operation in each of these cases was the same as that performed in the others, and while my experience has been limited, the other cases have gotten along nicely.

I would like to hear more in regard to the complications, which are really the points that worry some of us. It is not so much the question of whether we shall do the operation one way or the other, but it is a question of what shall we do with complications when they arise. I would like to hear from other gentlemen as to whether they have had similar experience.

A few days ago I listened to papers by Drs. Thorndike of Boston and Horwitz of Philadelphia. The discussion on these papers was participated in by men like Drs. Parker Sims, Willy Meyer, and Young, which was interesting indeed. The views expressed in that discussion varied as they have in this. Young presented a long list of prostatectomies without a death. One patient died several weeks after the operation from embolus in the brain, which he did not attribute to the operation. His results were all perfect seemingly. Recently in his operations he has retained the ejaculatory ducts without any great difficulty. To my mind, in a great many of these cases with marked pathology present, it is an impossibility to save the ejaculatory ducts in the course of a perineal prostatectomy.

DR. GOODFELLOW (closing the discussion on his part) —In reply to the various questions which have been asked, and also in discussing the paper of Dr. Moore in regard to complications, I will say that in all patients upon whom I have operated there have been no permanent perineal fistulæ. The longest time an opening lasted was between seven and eight months. It was a patient that I saw only on the operating table, and not again until he returned to me six or seven months later.

A question was asked by one gentleman with reference to temporary incontinence. At first, there is complete control of the bladder, after which there comes on partial incontinence; that is to say, there is inability to retain the urine when the desire to urinate comes, with some dribbling afterwards. In a number of cases this has lasted about four months, usually in men over 70. I have not found it in any man under 70.

Perforation of the rectum unquestionably does occur, but I have been fortunate enough not to have had the accident. I have known it to be done several times by skillful surgeons. I was consulted not long ago by a San Francisco surgeon who had had that accident happen, and as a result there was a fistula.

Whether my results are due to skill or good luck, you all have to judge. Probably it is luck. As I said, while such accidents have not happened to me, there is no reason why they should not at any time; but the method of operation followed during these years has been such that they have not.

One gentleman spoke in regard to a case which he had had. asking whether I would select such a case for operation. I will detail to you two cases, one in Washington, D. C., and the other one in San Francisco during the past two weeks, that will, I presume, answer the question. In the Washington case the man had been sick a number of months, just how many I do not know. He had had a suprapubic operation. At the time I saw him a drainage tube was in. He was septic; his temperature had been ranging from 101 to 102 degrees or more. I was asked by the surgeon in charge if I would operate on him. I said there was no excuse for operating upon such a case except to open an abscess cavity—the bladder—and in opening that the removal of the prostate was a mere incidental affair which ought not to affect him seriously. The operation was made (un-

der spinal cocainization), and eight weeks afterwards he was living. I operated some time in the early part of October.

The San Francisco case was similar to the one operated on in Washington. In this patient a suprapubic opening had been made and a drainage tube inserted. This man was also septic. It is now about fourteen days since the operation was performed, and at the time I left to come here he was doing very well. His temperature was normal, the wound was healing as rapidly as it could heal, although some urine still was passing through the suprapubic opening. As in the case in Washington, a drainage tube was used. In the Washington case the tube was retained by the skillful house surgeon; but in the San Francisco case the tube was pulled out by the man himself, and not reinserted until the ninth day, and then was retained only over night. Whether the Washington case went on to ultimate recovery or whether the San Francisco case will recover, I do not know.

There is one point I wish to impress upon you in regard to the different methods of perineal prostatectomy. Those who have devised various procedures for removing the prostate through the perineum like to see what they are doing. In my method of operating I see but little. I trust entirely to my fingers. If you remember, when, in 1882, we began to do abdominal sections for divers troubles, large incisions were made to see what we were doing. Now a small incision is made and the eye is in the finger. I have seen Drs. Young, Murphy and others operate for removal of the prostate, and they all make a large opening, so that they can see what they are doing. Through this large opening there is more or less traumatism to the perineum; at any rate, much more than there would be with a small incision such as I make. Dr. Parker Sims of New York makes the same operation that I do, except that he uses a rubber tractor. My finger is a shade under three inches working length, and I have had no difficulty in taking out a seven-and-a-half ounce prostate through a large median incision. It is the position in which the patient is put. It is the position that gynecologists found and adopted years ago. Examining the female, lying on her back it was found that the finger would barely reach the uterus, but by flexing the thighs on the abdomen and thorax, the

uterus was within easy reach, perhaps within an inch, and this position was adopted for operating, and that led me to use that position for prostatectomy. With the opposing fingers pressing down over the pubis and finger in the bladder, there is no difficulty (at least, to me there is none) in enucleating almost any kind of prostate. All of you can verify this with any male patient you may examine in your offices. Put him on the table; flex his thighs forcibly on the abdomen, press over the pubis, with one finger in the rectum, you have the bladder to the fundus between the fingers' ends.

Up to the time I adopted a small incision I never had any trouble about hemorrhage into the bladder. With the small incision ordinarily a patient will pass some urine by the urethra within a few hours after operation. I have had a patient do so as early as sixteen hours after operation, and generally inside of forty-eight hours some urine will come through the urethra. With a small incision, if there is any oozing, as the wound closes completely, the clots block the wound and urethra, and the hemorrhage goes into the bladder. I have had two such cases where the patients could not pass urine, but I have had none where the bladder has filled with clots. I was obliged to catheterize those patients some hours afterwards and that relieved the trouble.

As to stricture: One of the three patients operated on two years ago comes to my office about once a month to have a sound passed. He is 78 years of age. His tumor was pronounced carcinoma. Whether the trouble is due to stricture or to a slowly growing fibrous neoplasm or malignant recurrence, I do not know.

A man of 76, upon whom I operated over a year ago, now in Los Angeles, is having some trouble, and the attending physician thinks it is due to a stricture. Aside from those two, I know of no strictures.

I hope you will not think that I have overstated my case. Most of my patients are sent to me by other physicians, and so far as I am aware, the results are what I have told you. If they are not, when this discussion is published you will hear of it in some way.

DR. BOUFFLER—In what percentage of cases have you made complete section of the urethra?

DR. GOODFELLOW—I can not tell you. I presume I have removed most, if not all, of it in all cases. I would be likely to leave, as Dr. Moore has said, some of the

anterior upper part of the urethra. In many cases in which I have removed the prostate entire the urethra has come with it in toto, and these cases have done just as well as the others.

A MEMBER—What keeps the canal patulous?

DR. GOODFELLOW—It is impossible for me to say. I was in the habit of passing sounds for a while, but I find they do just as well without it. It may be the better plan to pass sounds nine or ten days afterwards. My friend, Dr. Chismore, one of the most eminent of genito-urinary surgeons, thinks I have gone too far in this way, and that it is better to pass a sound after a week or ten days. I have operated for him many times, and he is pleased with the results he has seen.

QUESTION—Do the patients complain of any pain after these operations?

DR. GOODFELLOW—I have never known them to do so, and do not recall having had occasion to use morphin for the relief of pain following prostatectomy.

With reference to the time of having the patients up and about after these operations, I usually tell them to get up when they feel strong enough after the operation, but usually it takes from four to six months for the bladder to become practically normal. Possibly I have gone to another extreme in letting them get up too soon. I believe it is better to keep them quiet for a longer time. Of course, they are permitted to sit up. For instance, the man I operated on two weeks ago in San Francisco was placed in a rolling-chair at the end of forty-eight hours after the operation.

DR. MOORE (closing the discussion)—Judging from the discussion that has been elicited, I think I have accomplished my object in writing this paper. I have made some of you confess, and confession is good for the soul. That is the object I had in view. Very few of us have been so exceptionally fortunate as Dr. Goodfellow. He is an optimist, as we all know, and for good reasons. I have had the fear that you might set me down as a pessimist, but I assure you I am nothing of the kind. I have had but one death, and this was due to uremia. I have seen my measure of complications in these cases, but no more possibly than my friend, Dr. Ferguson, who has told us a tale of woe. Those of you who have not had bad results or complications in these cases up to the present time will have them some day.

You can not operate on prostatiques and have such results without failures. It is simply impossible. I am extremely fortunate in having had my complications early in my experience. I had my complications to contend with at a time when Dr. Ferguson was one of the lucky ones. Dr. Ferguson reported several cases that he had operated on where everything went along swimmingly, while I had operated on five or six cases that did not run smoothly., I did not say anything, but I was waiting to hear what others would have to say in regard to the ultimate results of their cases. I am glad to know that Dr. Ferguson and others have had their troubles, because this demonstrates that we all have them.

Strychnia was mentioned, in addition to water and urotropin. I did not mention the use of strychnia because it is a routine practice of mine to administer strychnia before every capital operation. I get the patient under the influence of it a couple of days before the operation. I have no shock practically.

As to the cause of epididymitis, I believe Dr. Ferguson is correct in stating that it is probably due to infection traveling along the duct. Epididymitis comes on later, and I mention the use of instruments as a possible cause of it.

In regard to fistula, the case I mentioned in my paper was not my own. I operated upon this case for a practitioner in our state, who had performed an operation originally and had been unfortunate. He reoperated and tried to close the fistula, but failed, and I succeeded in the manner I have spoken of. Dr. Macrea tried it and succeeded. He may fail the next time, but it came out beautifully that particular time.

Dr. Ferguson spoke of gauze packing. I have used it in most cases, yet as time goes on I am more and more disposed to close without packing. I simply use my surgical sense as I go along. One can not lay down hard and fast rules to be followed in all of these cases. If I have got a nice clean opening, I take catgut and close it. and I have been much pleased with the results.

Dr. Lord objected to sewing up the cavity, on the ground that it might add to the danger of sepsis. I do not see how it could occur when we use ordinary catgut. It does not make it any more possible for general infection to take place. When the parts are brought

together there is less likelihood of extension of infection. If the wound becomes infected the catgut will give way.

Dr. Jepson said that we can not remove the whole prostate without removing the urethra. I agree with him. What is the good of removing the whole prostate? We are not after the whole thing. We are after the disease; it is not the prostate we are after. There are certain diseased conditions connected with the prostate, and it is rarely indeed in my experience that the bridge running across in front of the urethra has been involved in the disease. It is unnecessary to remove the whole prostate; it is a mistake to undertake it.

Dr. Jepson said that the length of his finger is insufficient to enable him to do the perineal operation properly, and that he has succeeded better in doing the suprapubic operation. Some years ago, when I read a paper on perineal prostatectomy and its advantages over suprapubic prostatectomy, at the American Surgical Association, it led me to make some experiments on the cadaver, and I found the prostate was considerably closer to the surface of the perineum than to the surface of the abdomen; therefore, it required a longer finger to do the suprapubic operation than it did the infrapubic. But Dr. Jepson thinks that he can not do the lower operation as well, and I have no doubt that his experience corresponds with that of the rest of us, when we first began to do obstetrics or gynecology. I remember very well the first obstetric case I had I could hardly reach far enough; my finger was not long enough. That finger increased wonderfully in length with experience.

Dr. Jepson—I have had experience with both routes, but I am not as expeditious with the perineal route.

Dr. Moore—I felt as the Doctor did at one time. In answer to Dr. Jepson's other remark, I would say that epididymitis occurs as a complication from the suprapubic, as well as from the perineal operation. I do not think it is a complication which is particularly incident to the perineal operation.

Dr. Fairchild said it was difficult for him to understand how a man could tear into the rectum. After a few years' more experience he will probably get into the rectum the same as the others have done. In Dr. Mac-

rea's case the fistula occurred late. That was unavoidable. It was not the Doctor's fault.

Dr. Macrea touched on one point that has appealed to me all the way through this discussion, and it is a point that made it possible to read such a paper as I have without being misunderstood and doing it for the good of all. I have every faith in the honesty and integrity of the members of this Association, and it has been clearly demonstrated to me that my faith has not been misplaced from the confessions that have been made during this discussion, and the questions that have been asked, and the members have been ever ready and willing to give us the benefit of their experiences.

# THE USE OF SILVER FOIL TO PREVENT ADHESIONS IN BRAIN SURGERY.

M. L. HARRIS, M.D.
CHICAGO.

The formation of adhesions involving the cortex of the brain and its covering membranes is the rock on which the ultimate success of many otherwise brilliant and successful operations on the brain is wrecked. The harmful influence of posttraumatic and postoperative adhesions of the surface of the brain in the production of epilepsy is universally recognized, and many suggestions have been put to application by the surgeon to prevent this occurrence, but only too often do we find that after a brilliant localization of a brain tumor or other cortical lesion by the neurologist, and a faultless operation by the surgeon, the terrible fits after a momentary pause recur with all the old vigor and frequency. It is unfortunately true that operative treatment in the large majority of the cases of epilepsy due to distinct local lesions is a failure, owing to the formation or re-formation of adhesions. The adhesions which are the most harmful are those which take place between the dura and the brain. Concerning these, Schär[1] says: "One may be able to elevate a depressed bone, remove a cyst or a connective tissue scar, or a mass which is pressing on the brain, but on the other hand, it is useless to divide adhesions between the dura and pia, or pia and brain, because the same immediately after the operation inevitably re-form."

1. Arch. klin. Chir., lix, 670.

Fortunately not all surgeons entertain such a hopeless view of the subject, and many of them have devised plans for preventing the re-formation of the adhesions, which are frequently successful. When a bone flap is formed which can be replaced, it has been suggested that the dura be removed entirely over the affected area, or that a flap of dura be brought out and turned over on the outer surface of the bone flap when the latter is replaced, after the methods of Keen and Chipault. These methods, which have apparently been followed by success, permit the brain or its covering pia to lie in direct contact with the inner surface of the bone, to which adhesions are not so likely to form. As a firm dura, however, is the best means of preventing the formation of that very unpleasant complication of brain surgery, namely, hernia cerebri, it is very desirable to retain this membrane whenever possible. It has, therefore, been proposed to interpose certain substances between the dura and the brain, in the hope that thereby the formation of adhesions might be prevented.

Beach,[2] in 1890, first suggested the use of gold foil for this purpose, and two years later used it in a case of epilepsy in which convulsions had returned after an operation done two years previous. Improvement followed the use of the gold foil at the second operation. Following this, cases in which gold foil was used were reported by Estes,[3] Oliver,[4] Summers,[5] Wier and others. Oliver's case, one of epilepsy, had been operated on before and some bone removed. Convulsions recurred and a second operation was done, adhesions separated and a plate of gold foil interposed. The patient had no more convulsions up to the time of his death, which occurred suddenly at the end of four months. At the autopsy the gold plate was found in position, and had served its purpose

2. Bost. Med. and Surg. Jour., April 3, 1890, and March 25, 1897.
3. THE JOURNAL A. M. A., April 1, 1896.
4. Ibid., May 30, 1896.
5. Med. Rec., April 24, 1897.

in that it had prevented the formation of adhesions. Woolsey[6] reports a case in which he used gold foil. The case was one of traumatic epilepsy, and had been operated on previously, at which time a piece of thickened dura about two inches in diameter was removed. As no improvement had taken place at the end of ten days, the wound was reopened and "a piece of gold foil was inserted between the scalp and the brain. The gold foil was sterilized by heat, but unfortunately it came in paraffined paper, and some of the melted paraffin had adhered to its surface. There were probably some small tears made in separating the paraffin from the paper." The patient was in perfect health for several months, when his attacks recurred. Dr. Woolsey reopened the wound and found that the gold foil had not prevented adhesions of the scalp to the brain. The gold foil had broken up into particles and between them newly formed fibrous tissue had grown, forming a layer of considerable thickness, embedding the gold foil and forming firm adhesions between the scalp and the brain. Dr. Woolsey was unable to say whether this would have been the result had the gold foil been entirely intact. It was the thickest foil kept in stock by a large dental manufacturing establishment. Freeman[7] says: "I possess a specimen of foil (gold) which I placed in the trephine opening in the posterior fossa during the course of an operation for cerebellar tumor. The patient lived about three months, and during that time considerable new connective tissue had formed." No details of this case are given. He does not state the nature of the tumor, whether it was removed or not, where the new connective tissue was formed, nor where the foil was placed.

The use of thin rubber tissue as recommended by Abbe has been tried by a number of surgeons, and with apparent success by some. McCosh[8] says: "One patient on

6. Ann. Surg., 1897, vol. xxv, 630.
7. Ann. Surg., 1898, xxviii, 455.
8. Amer. Jour. Med. Sci., 1898, cxv, 549.

whom I operated thirty months ago carries without signs of irritation a piece of this tissue on the surface of his dura. That it may, however, act as a foreign body is shown in Case 13, and there is no proof that the so-called 'life' should be longer in its new home than it would be in the external world." The case mentioned was one in which a piece of rubber tissue had been inserted. The patient did well for about twenty months, when his convulsions recurred. Another operation was performed. "A scalp flap was lowered over the old trephine opening, which was found filled with dense connective tissue, to which the scalp was intimately adherent. A layer about one-sixteenth of an inch thick was dissected off. Under this was felt a mass of apparently cicatricial tissue, very hard except near the center, where there was a roundish nest consisting of soft, almost granulation-like tissue, in which were seen blackish particles, which were found to be scraps of rubber tissue amalgamated with the soft connective tissue into a mass the size of a small cherry. This was cut out by scissors."

The case was then treated by placing over the brain a piece of platinum foil about the thickness of a sheet of note paper. Primary union and at the end of eight weeks he had no return of attacks.

Dr. Abbe,[9] who performed the first operation on this case and introduced the rubber tissue, says that "he was not surprised that development of granulations about the rubber had ultimately broken it up and enveloped it. It simply showed nature's effort to expel it when suppuration had once started. No argument could be based on this case as to the behavior of tissue in non-suppurative cases."

In 1898, Freeman[10] recommended the lining membrane of an egg in place of the inorganic substances. He tried the membrane in two experiments on animals, but had not used it on the human subject. In 1900, Greer[11]

9. Ann. Surg., xxvii, 671.
10. Ann. Surg., xxviii, 455.
11. Bristol Med. and Surg. Jour., 1901, xix, 42.

used egg membrane in an operation on a lad who eleven years before had sustained a compound fracture of the skull and who had suffered from epilepsy since. The skull opening, which resulted from the fracture, was found filled with dense tissue. In separating this tissue some brain substance was removed. Two pieces of eggshell membrane were placed—one between the brain and the skull and the other outside the skull. The scalp was then replaced and primary union occurred. Four months after the operation the old scar broke open and left a small hole in the scalp, through which the eggshell membrane could be seen. This was pulled out in its entirety. It was still tough and showed no apparent change in its structure. The wound then closed. The subsequent history of the case is not given, so we are left in doubt whether any good was accomplished by the operation or not.

The question of closing defects in the bone by celluloid or thick gold or silver plates or by plastic operations, is not under discussion, but simply the question of the prevention of adhesions between the brain and its membranes or the bone.

The general principle of the introduction of some foreign substance has been tried in a sufficient number of cases, and with results, too, which seem to justify our belief in its efficacy.

The best material to be used and the details of technic, however, are questions still to be worked out. There are some points which appear to be well established. For instance, the traumatism incident to the operation should be as slight as possible. A bone flap which can be replaced is preferable, when possible, to the trephine opening with the bone left out. Before the introduction of any substance hemorrhage should be perfectly controlled and all blood clots removed. The substance should extend well beyond the edge of the area involved in the adhesions. There should be no openings or breaks in the substance. The material must be one which can be steril-

ized. The wound must heal in a perfectly aseptic manner. The question of material is not so well settled. Whether the organic substances, such as egg membrane, prepared ox peritoneum, etc., will prove of value remains to be determined. They have not been used often enough to relieve one of the theoretical doubt of their efficacy, as the case of Greer, mentioned above, is unsatisfactory. Thin rubber tissue has been used a number of times with good results. The author has a patient who has carried a good sized piece of rubber tissue in his skull for several months with an excellent result. One disadvantage of the rubber is its tendency to roll up after it has been inserted. It then not only fails to fulfill its purpose, but may be an actual cause of irritation. The author knows of one unreported case in which the rubber, which had to be removed some months after it was introduced, was found all rolled up. The rubber may also be disintegrated by granulations, as in McCosh's case.

The use of the thick, unyielding metal plates or the heavy foils, such as the No. 60 or thicker dental gold, the author believes as a rule undesirable. The heavy plates may become tilted and act as irritants or gradually work their way to the surface; or late suppuration may occur, necessitating their removal, as the author has known in one case. Of the materials thus far proposed, the author believes the thin foils are the best, and of these he prefers the silver foil. It is so thin and soft and smooth. It conforms to all irregularities of the surface on which it is laid. As many layers may be applied as may be necessary to secure a smooth, unbroken surface. It is not only tolerated very kindly by the tissues, but exerts a beneficial influence on granulating or healing surfaces. The foil may be placed directly in contact with the brain tissue, between the pia and dura, or wherever it may be necessary to accomplish the purpose desired.

The author has used the silver foil in a number of cases of brain surgery, and while no claim for anything

new is made, he wishes to urge its more frequent use for the purpose indicated, and with greater care in reference to the technical details above mentioned.

The following case will illustrate the application of the principle:

George P., aged 12. When three years old he fell out of a chair and injured his head. He was taken to a hospital, where he remained two weeks. After returning home he was all right for about two years, when he developed epilepsy. The attacks were of the Jacksonian type, beginning in the left arm. In addition there was partial paresis of certain muscles of the left arm, and to a very limited extent of the left leg. He entered my service at the Children's Hospital, June 22, 1900. Dr. H. T. Patrick saw the case with me, diagnosed a cortical lesion involving the left arm center, and advised operation. This was done July 10, 1900.

A large osteoplastic flap was turned down, uncovering the area indicated. A subdural calcareous mass was found about 3 cms. in diameter by 1½ cms. in thickness. It was firmly attached to the inner surface of the dura as well as to the brain tissue. A dural flap was turned down and freed from the mass. In removing the mass the cortical surface of the brain was unavoidably injured, and quite a depression remained in the brain tissue. After controlling the hemorrhage, the dura was replaced and sutured, as was also the osteoplastic flap. Primary union occurred and recovery was without incident. He left the hospital Aug. 5, 1900.

Notwithstanding the fact that active treatment with the bromids was pushed after the operation, relief from the attacks only lasted about two months. They then recurred and gradually increased in frequency and severity until in February, 1902; when he again entered the hospital he was having from five to eight fits a day. The left arm was quite weak and movements impaired.

The second operation was performed February 17, 1902. The same osteoplastic flap was turned down, and

the dura opened. Firm adhesions were found between the dura and the brain tissue. These were carefully separated and hemorrhage controlled. Several layers of very thin silver foil were then placed over the brain tissue, extending some distance beyond the area involved in adhesions. The dura was then replaced and sutured, and the skull closed as before. Recovery from the operation was perfect, and he left the hospital March 23, 1902. The bromid treatment was continued as before. He has been under observation up to the present time, and although it has been a year and ten months since the last operation, he has not only not had a single fit, but has improved materially in his left arm as well as in his general condition. He attends school regularly and says he feels perfectly well.

## DISCUSSION.

DR. JOHN P. LORD, Omaha, Neb.—I have been very much pleased and impressed with Dr. Harris' paper, and I fully agree with him in the use of foil in such a case as the last one reported. The use of foil and plates is a question which is before the profession somewhat. The laity also has a considerable notion of its use. I have always taken the position that in cases of traumatism, where the tissues are in a bad condition, and where we are likely to have a discharge of brain tissue, with the danger of hernia cerebri, it is better not to undertake the use of these foreign bodies at this time; that it be done more as a deliberate procedure, so nicely demonstrated in Dr. Harris' last case, and that really is its true field.

To illustrate my meaning more fully, I will say that I had a case of a boy who was struck by a street car which caved in nearly the whole left frontal region. There was not only marked traumatism of the brain, but a continual oozing of brain substance. I operated during a comatose condition, relieved the pressure, and removed a little of the brain tissue. There was considerable traumatism of the lobe on that side, and lest there be accumulation of blood clots and discharge within the cavity, radiating drains were used. This case discharged more

or less brain substance for eleven days, as I remember, and I vigorously maintained (against the solicitation of friends and general practitioners in the case) that it was entirely impracticable to undertake the use of any such material at this time, as it would have acted as a foreign body. I would like to hear Dr. Harris' views regarding that particular feature.

Dr. Thomas J. Maxwell, Keokuk, Iowa—I have had some experience in brain surgery in cases of epilepsy. I recall the case of a young woman, about 26 years of age, who had epilepsy for, I think, about twelve or thirteen years. She had the Jacksonian form of the disease, in which the single symptom was contraction of the left index finger, the contractions running up the arm, involving the muscles of the side of the neck, shoulder, and down the leg, on the left side. Passing over to the right side, the convulsion became general; unconsciousness. By measurement the fissure of Rolando was located on the right side and marked out by analin pencil. The left hand motor area was located on the skull by a sharp instrument thrust through the scalp. I turned down a horseshoe flap, base toward temporal artery, uncovering the hand center marked on the skull, took out a button one and a half inches in diameter, incised the dura and turned it down in order to determine that we had the brain center that presides over the hand. I had prepared an electrode with the two poles one-fourth of an inch apart, which was connected with a faradic battery, applying this to the exposed brain, and turning on a little current. The index finger of the left hand immediately responded by contraction or flexion. The convulsive actions of the muscles spread to the left arm and shoulder and to the left leg. Just as in an attack of epilepsy, fearing a general convulsion, the contact was withdrawn. I then removed a portion of brain one-half an inch square and an inch long and closed the opening. The girl had paralysis of the finger next day, which continued for about eight or nine weeks, but she slowly regained control of the finger and had no more convulsions as long as she remained in the hospital. It is about nine or ten years since I have heard from her.

Dr. Harris (closing the discussion)—I believe Dr. Lord's position is correct, and I mentioned that point in the paper. These operations, to be successful, must all

be done in a perfectly aseptic manner, which, of course, is out of the question in the class of cases he mentioned. I believe there will be a recurrence in the doctor's case, as that has been the usual rule when sufficient time has elapsed after operation and adhesions have occurred. Without the interposition of such material to prevent the adhesions from reforming they will invariably reform.

# DEMONSTRATION OF ANATOMIC TREATMENT OF FRACTURES OF THE FEMORAL NECK.

C. E. RUTH.

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The fact that 6 per cent. of all fractures involve the neck of the femur, giving as a result non-union in the majority, with useless limbs, renders the subject of enough importance to justify its consideration in the light of all the latest attainable information. There is nothing to be gained by attempts to differentiate between intra-, extra-capsular and mixed varieties, for when not impacted their management to be successful can differ in no important particular. Diagnosis is rarely attended with difficulty, the assemblage of symptoms being characteristic. This does not hold true, however, in penetration or impaction cases, when diagnosis may be impossible by justifiable methods. In such cases the diagnosis will be usually cleared in a few days by loosening of the fragments, or the impaction remains permanent and insures good results, barring complications in themselves serious. Our leading surgical authorities inform us that permanent impairment is to be expected, death is not uncommon, and that non-union results usually from fractures through narrow parts, owing to impossibility of accurate coaptation and immobilization of the fragments. That coaptation and immobilization of fragments is certainly obtainable I will demonstrate, I think, beyond controversy. The treatment which I here advocate is applicable to any solutions

of continuity involving any part of the femoral neck and its connections to the shaft, to all ages and physical conditions, gives as great comfort as any known plan, is easy of application, requires little time to adjust, needs no elaborate apparatus, gives no danger of pressure in-

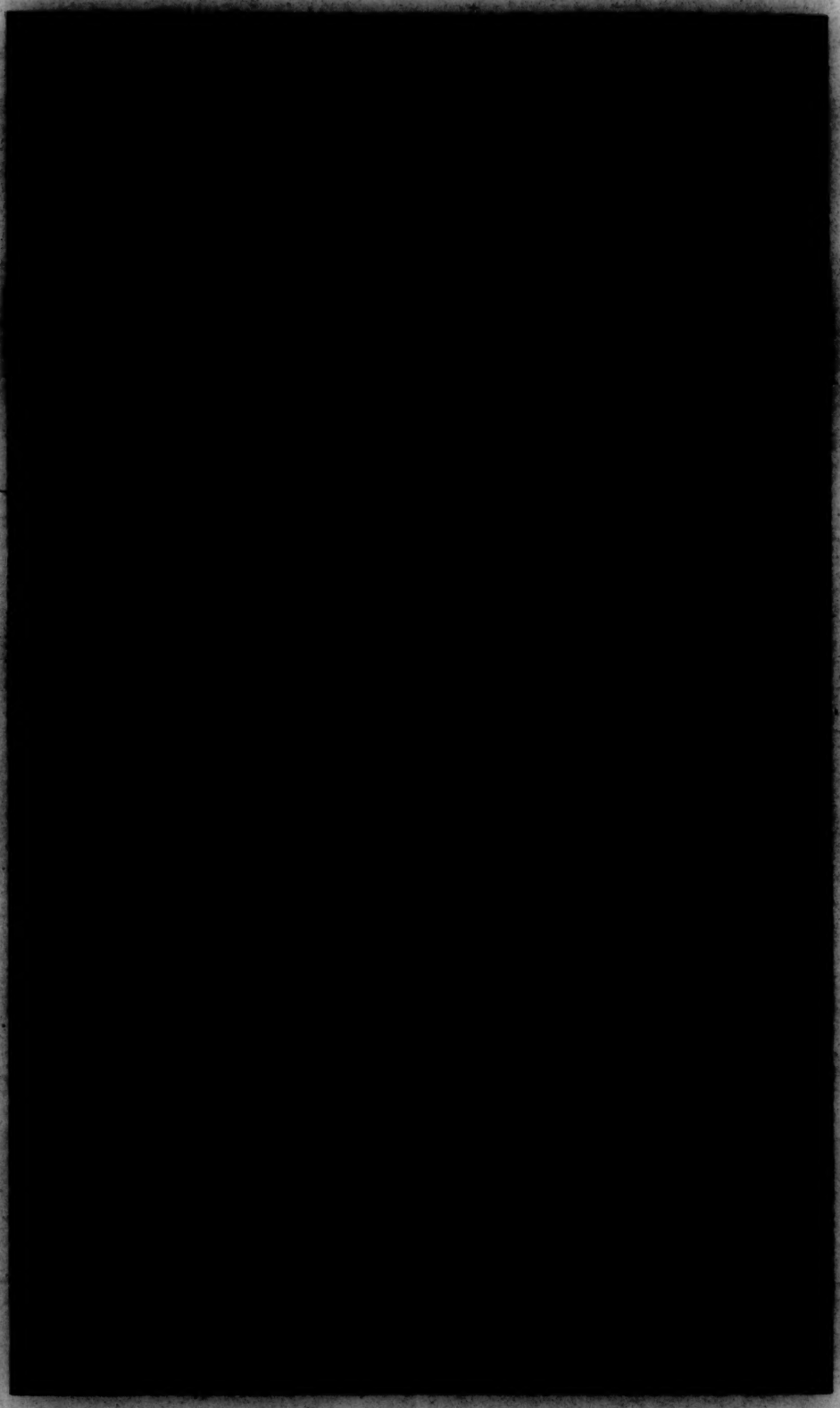


**Fig. 1.—Fracture of neck of femur in Case 2. At 72 years of age, used 20 years afterwards. No perceptible shortening.**

jury, places the fragments in apposition when properly adjusted and overcomes all displacing tendencies of weight and muscular action. The latter is the principal factor in preventing union and causing impairment of

function. It gives immediate and complete relief from pain. That bony union has occurred in all varieties of fracture of the femoral neck is no longer denied by well-informed medical men. That useful repair in the aged by the usual methods occurs only in a small per cent. is recognized by all physicians and attested by cripples from this cause in all communities. Fourteen years ago I became impressed with the reasonableness of the method and results obtained by Prof. T. J. Maxwell in this class of cases and have used it in all my cases of



**Figs. 2 and 3.—Vertical section of femoral neck fractured 20 years before. Case 2 of former report.**

this nature and taught it to my medical classes ever since. Dr. Maxwell has practiced and advocated the method for 34 years. I published a report of 17 cases in THE JOURNAL, August 26, 1899. Again at the St. Paul meeting of the American Medical Association, 1901, I presented a supplementary report of 8 cases, making a total of 25. This paper was published in THE JOURNAL, December 21, 1901. At the St. Paul meeting I also presented a specimen of a bone broken in a man aged 72 years. This was Case 2 of my report August 26,

1899, and represents the result in the second case treated by Dr. Maxwell and gave its possessor satisfactory service, without impairment of function, for 20 years thereafter, though slight eversion of the foot gave constant testimony of its former solution of continuity. The only trouble is the result is too good to be believed by those

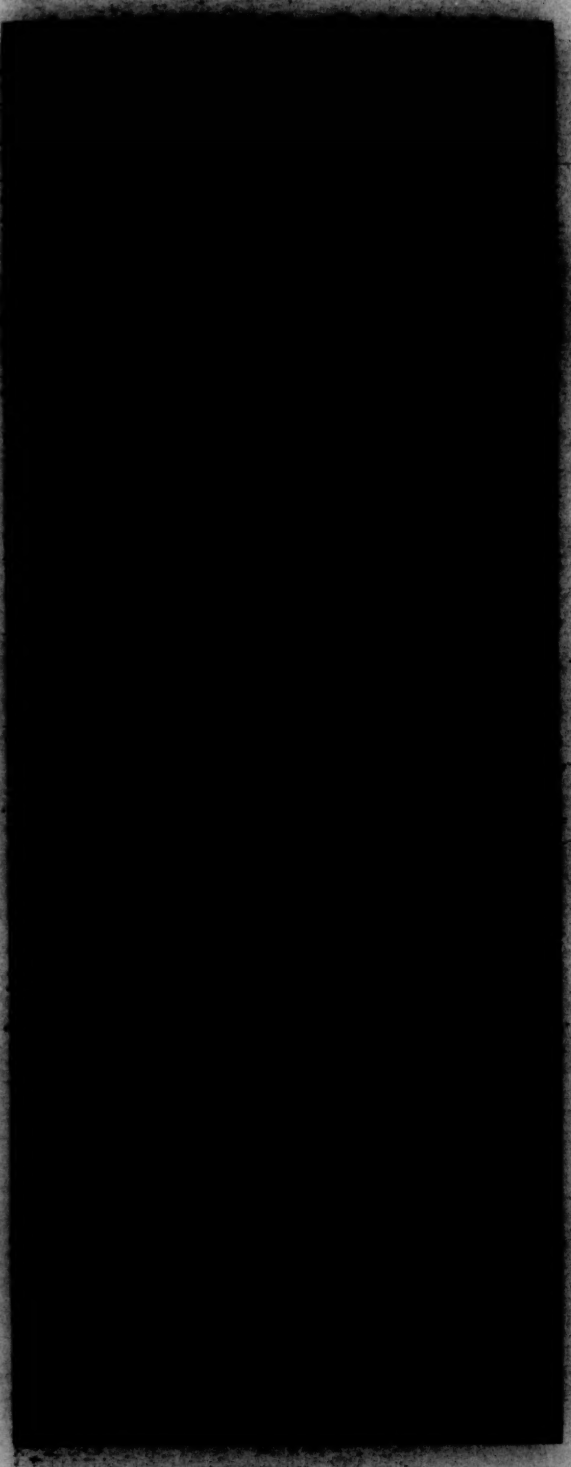


Fig 4.—Shows normal position, relation and line of action of the psoas and iliacus.

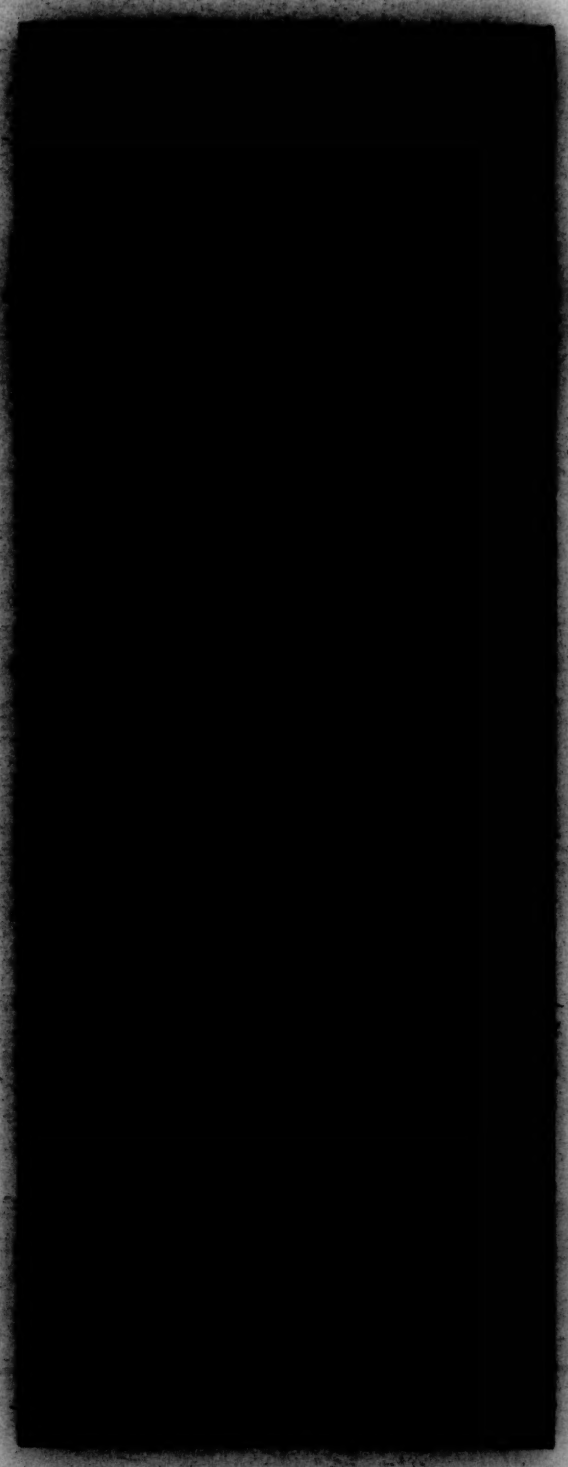


Fig. 5.—Muscle pushing itself or other soft parts between the fragments and producing external rotation.

who are unacquainted with Dr. Maxwell's skill in adjusting and retaining such fractures and who do not understand the aid of the capsular ligament when properly utilized as an adjusting and retaining force. Perfect

adjustment of the fragments must occur when traction is made in line with the normal axis of the femoral neck, provided the capsular ligament is not almost or quite destroyed, together with the surrounding muscles. This fact I have demonstrated by experiment on the cadaver

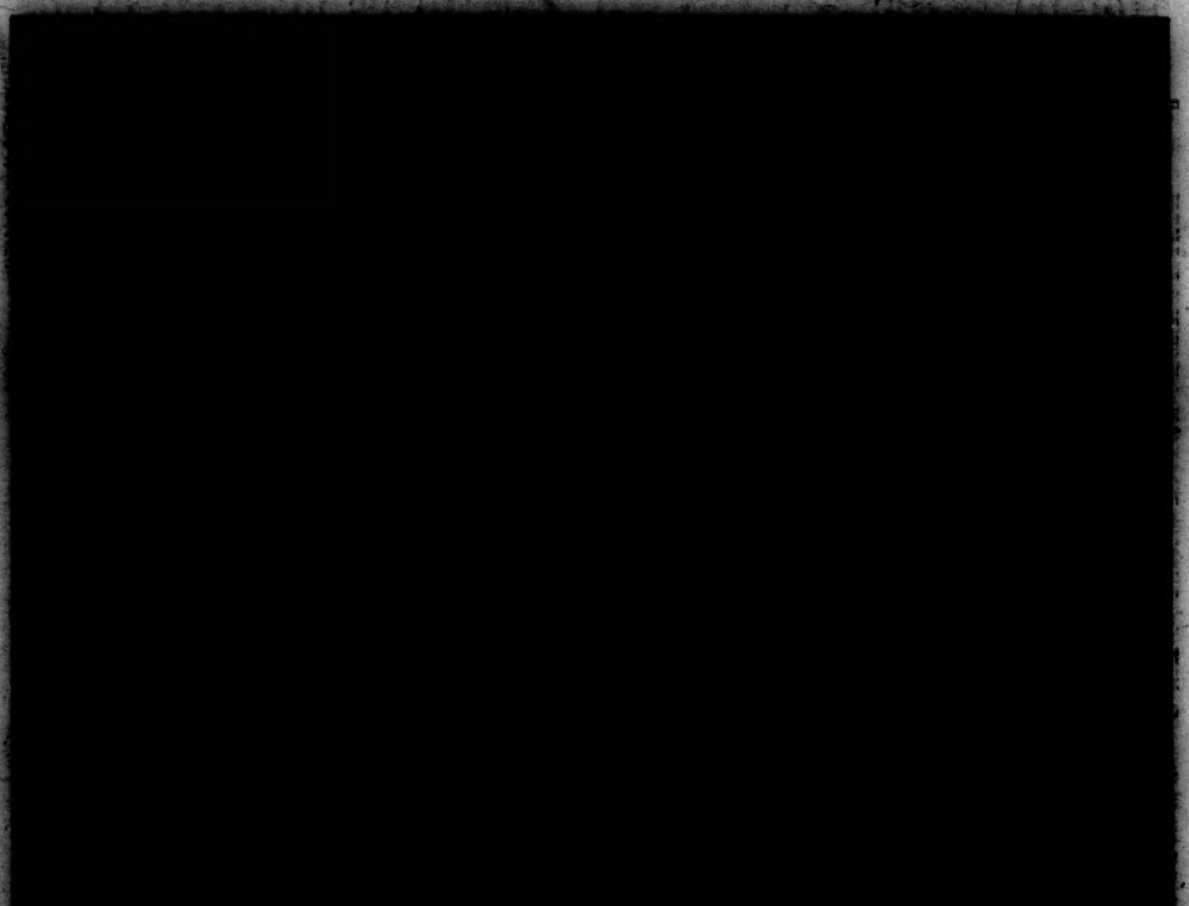


Fig. 6.—Case 34. Union in four weeks. Treatment not begun for week after fracture. Position perfect. Death from cerebral softening. Had patient lived one year the result would have been as perfect as Figure 1.

and now show you by this wet specimen. Sufficient traction in the normal line of the femoral neck compels the capsular ligament and surrounding muscular tissue to act as a close-fitting sleeve to adjust and align the frag-

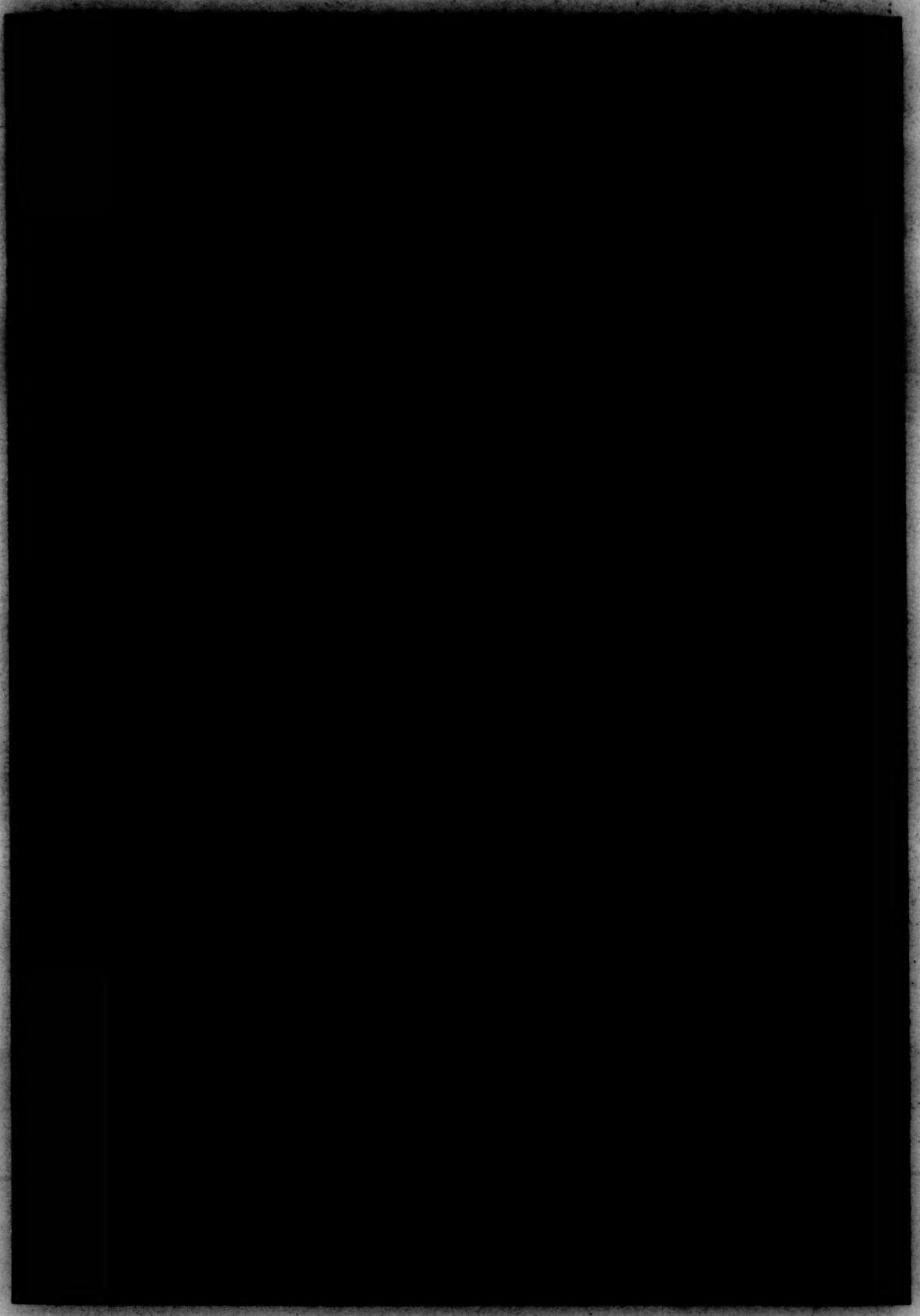


Fig. 7.—Anterior view. Case 29.

ments; and if traction be maintained, the relation will also be undisturbed. The tendency is for the lower fragment to fall behind and then be drawn upward and inward, resulting in posterior displacement of the lower

fragment. It necessarily follows that the anterior part of the capsule falls across the upper fragment, which may be tilted in any direction, and if proper traction is

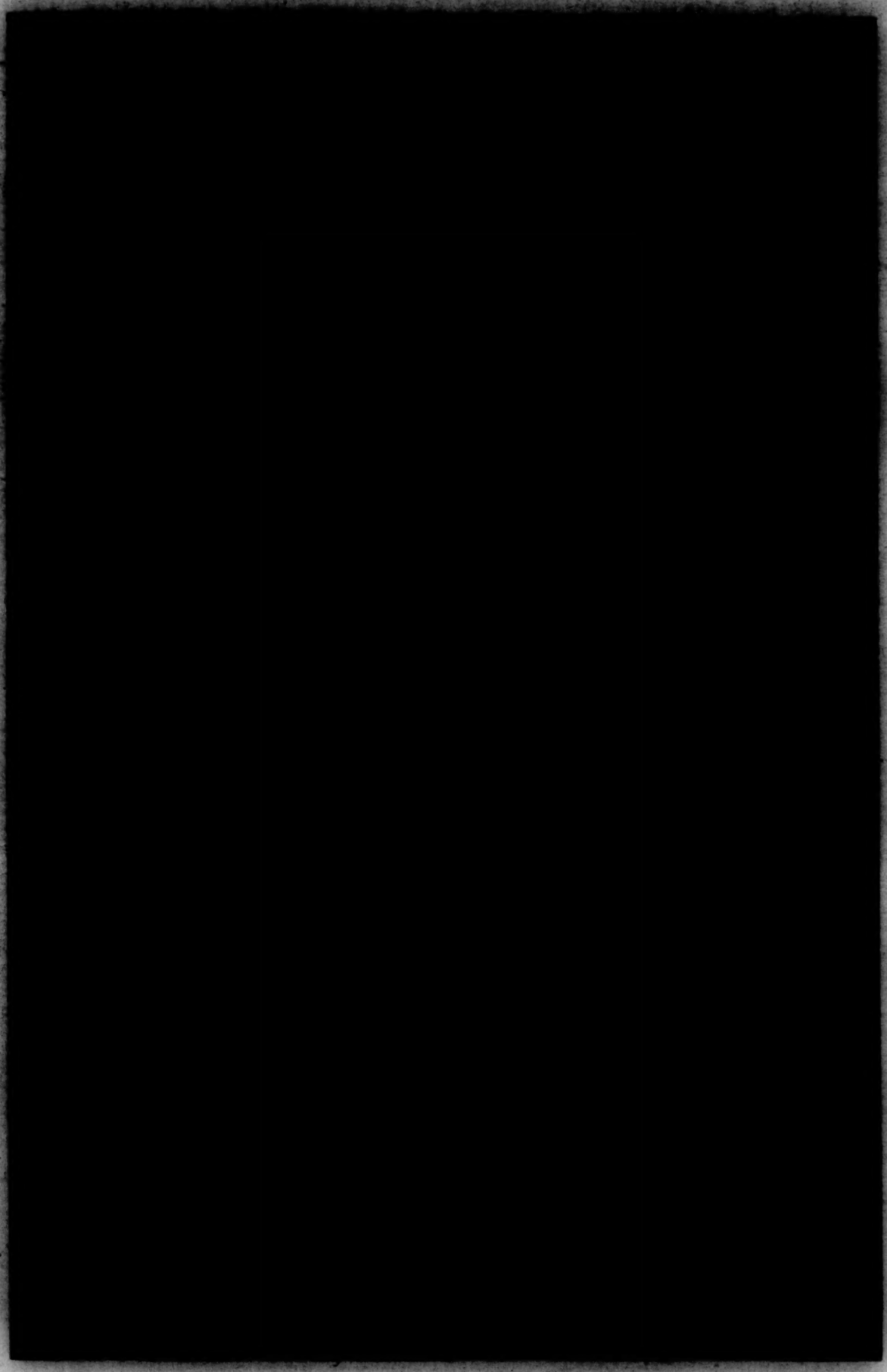


**Fig. 8.—Posterior view. Case 29. Royce, aged 81. Recovery functionally perfect. Death caused eight months later by sunstroke.**

made the capsule will carry the upper fragment, now free of any muscular attachment, passively into line. The action of the psoas and iliacus is normally that of a

flexor with neutral or internal rotation. When a solution of continuity occurs in the femoral neck they immediately become external rotators. They may also act in such a way as to force the soft parts between the fragments, rendering thereby bony union impossible unless the impediment be removed. In 17 additional cases which I have collected since my report at the St. Paul meeting of the American Medical Association I have

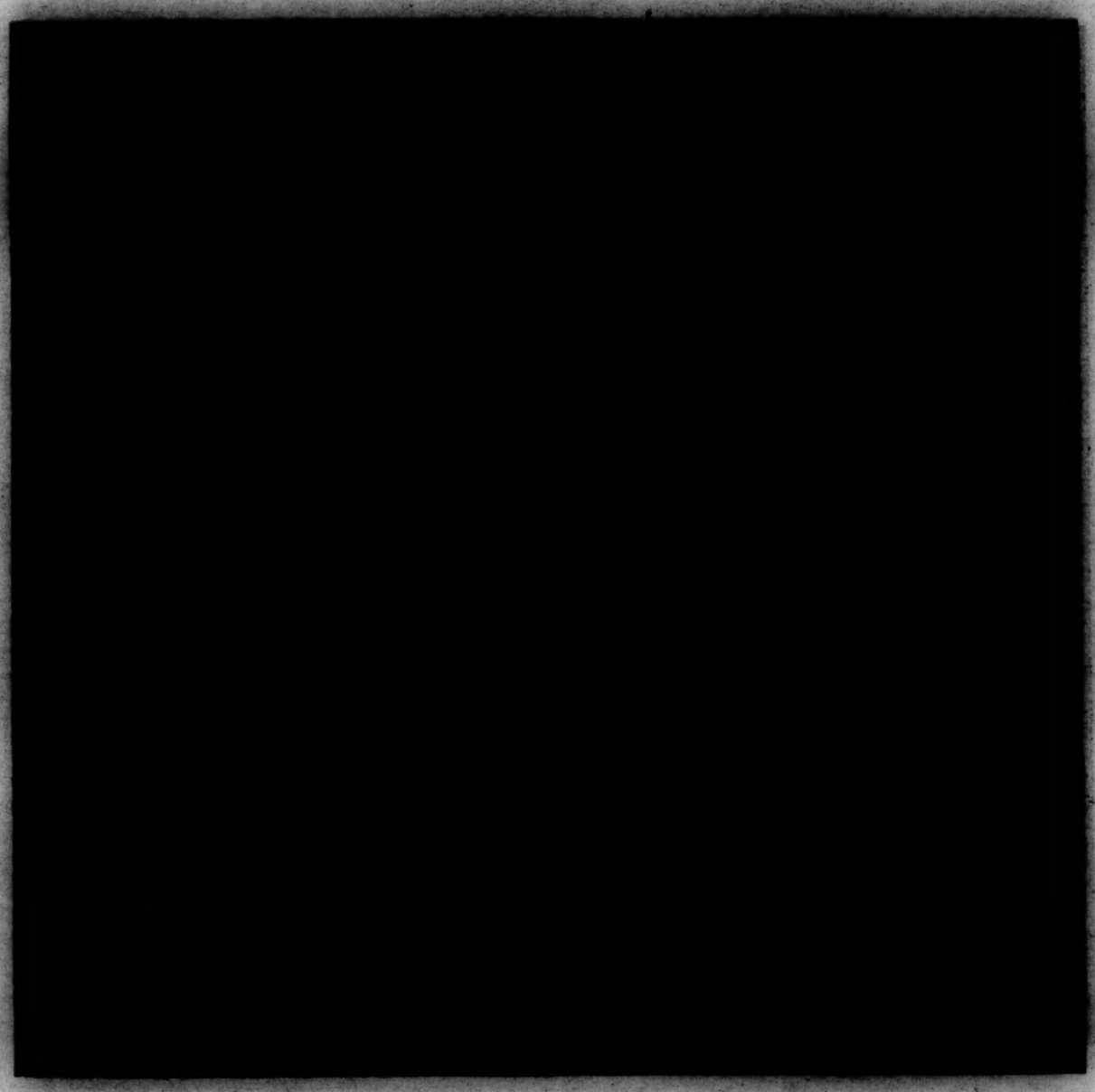


Fig. 9.—Case 22.

given the names, as in my previous reports, of the physicians in charge and their addresses,[1] which includes 15 of these cases reported at the Saratoga meeting in June. Three of these cases have furnished us specimens, one of which should put forever at rest all questions as to the possibility of obtaining results equal to that of Case

1. See Journal of the American Medical Association, Nov. 29, 1902.

2 (See Rankin specimen, Case No. 34), a specimen of which I here present for your inspection. One proves the possibility of bony union, with no impairment of function, in a case 81 years old (Fig. 7), treated by a novice (See Case 29, George Royce), a specimen of which also I present. The third specimen, that of Mrs. Hendershot, who was treated by me in January, 1901, for fracture of the neck of the right femur,

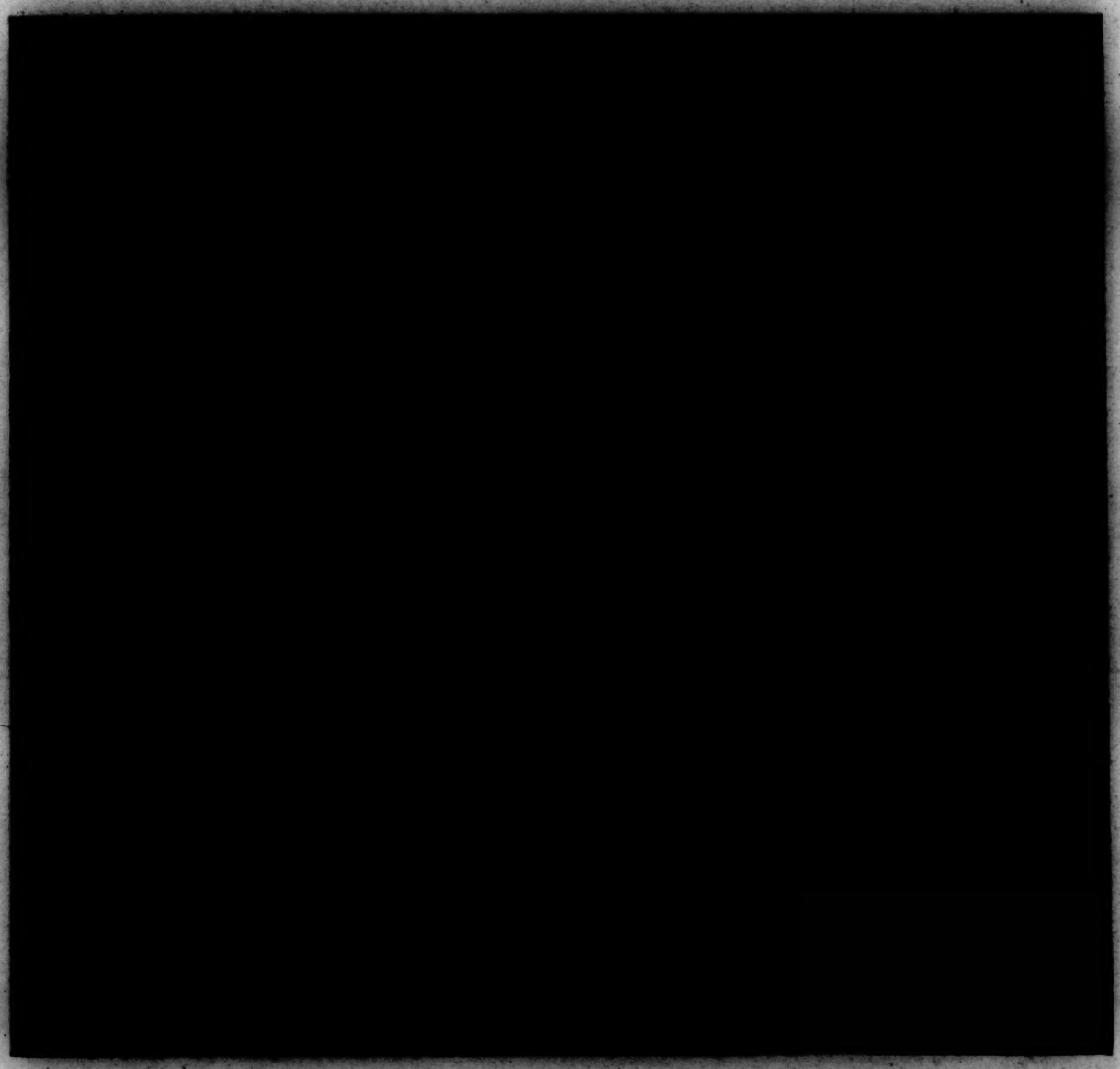


**Fig. 10.—Case 22. Mrs. Hendershot. R. and L. femur. Right femoral neck fractured January, 1901. Treatment begun week after injury. Functionally perfect save slight eversion. Figure 9 shows neck shortened ½ in. on right femur. Also shows no shortening in the vertical measuring from top of femoral head to trochanter minor. Figure 10 shows eversion of the limb, the right femoral head being posterior to left when the shafts are in the same position.**

was reported by me as Case 22. She died December 16, 1903, and I secured these specimens of the upper end of each femora, and herewith exhibit for your inspection by comparison. (Figs. 9 and 10.) This woman lived

nearly three years after the injury, with no demonstrable shortening whatever by the most careful, repeated measurements. Some eversion of the foot gave the only testimony whatever to the existence of a former solution of continuity in the bone. This case came into my hands one week after the injury occurred, was suffering severe pain, had shortening of an inch and a half, with complete eversion of the foot. It will be noted in this specimen that, though the posterior measurements of the neck of the right femur shows it to be one-half the length of the left femoral neck, there is no difference in the distance from the level of the lesser trochanter, which was not disturbed by the fracture, to the highest point on the head of the femur. No greater error has been fostered by the profession for the manufacture of cripples than to accept the teaching that union fails because adjustment and immobilization can not be obtained, as proven by these specimens, and the large number of cases which we have been able to collect. Muscular action is of as much importance in determining results of fracture here as anywhere else in the body. But to obtain satisfactory results the inward pull of the short muscles attached to the upper end of the femur, as well as the limb's weight, must be reckoned with as certainly as those muscles which pull almost or quite directly upward. The method of treatment which I here illustrate to you is as follows:

Patient on the back; after making the diagnosis the thigh should be flexed at right angles to the trunk to relax the psoas and iliacus and bring their line of action above the neck of the femur to prevent them from in any way forcing soft tissues between the fragments; extension must now be made while an assistant makes traction outward on the upper end of the femoral shaft and raises the trochanter major to the same level as its fellow; fifteen to twenty-five pounds weight is now to be used over a pulley to make downward extension on the leg; this is accomplished by the ordinary Buck's exten-

sion, with wide adhesive straps extending well above the knee and passing a cord through a pulley at the foot of the bed. This weight must be maintained according to the muscularity of the individual, sufficient to overcome the action of the long muscles, which act vertically. Binder's board or other material should now be molded to the internal, anterior and posterior aspects of the upper parts of the injured thigh, and around this a broad band of muslin or other material is extended through a pulley at the side of the bed, about on a level with the



Fig. 11.

highest point of the iliac crest, projecting a sufficient height above the bed and carrying sufficient weight to maintain the trochanter major as prominent as the one on the opposite side and to overcome the posterior displacement of the weight of the thigh and the tendency to eversion. The usual precautions are necessary to prevent pressure upon the malleoli. Bed and pressure sores can be avoided with reasonable care. The knee should be flexed every four or five days to prevent ankylosis, as the neglect of this precaution has caused ankylosis of the knee in one case.

The counter extension for longitudinal and lateral traction is made by the patient's weight. The foot of the bed is raised enough to overcome the tendency of the patient to slide toward the foot of the bed, and amounts to from ten to fifteen inches, according to the amount of weight required to overcome the muscular action. The side of the bed corresponding to the injured limb is also raised enough to overcome the tendency of the patient to be drawn toward the lateral pulley. The



Fig. 12.

tilting required will be from two to five inches and will depend somewhat on the width of the bed. A single narrow iron bed is to be preferred. The anatomic method adds no complications to an already grave condition by operation or otherwise. I have yet to know of a single patient with fracture of the femoral neck treated in this way who has complained of pain in the hip after suitable adjustment of the weights and pulleys, nor have they complained of pain or other discomfort from the movement necessary to put the bedpan under them,

nor when raised to the sitting posture for cleansing, changing clothes, etc. Daily raising of these patients to the sitting posture, as above indicated, will not in the least disturb the fragments if the longitudinal and lateral traction is steadily maintained. These patients within one or two days can usually raise the hips themselves with the sound leg so that the bedpan can be readily used. Four to six weeks of confinement, which is all that is usually needed to procure union, is not an element of danger in itself; besides, no plan of treatment or non-treatment so far devised can give greater if equal comfort and freedom of movement.

Cases not previously reported include the two following:

CASE 41.— ————————, Warsaw, Ill., aged 52, in September, 1902, sustained a fracture of the right femur by a fall sixteen feet from a ladder. Patient came under the care of Professor Maxwell eight days after the injury; shortening existed of one and three-quarter inches, eversion complete; considerable swelling of the hip existed, accompanied by great pain. Diagnosis, fracture of the femoral neck; treatment, by the anatomic methods by longitudinal and lateral extension, no pain after application of the dressing, recovery and discharge from the hospital in five weeks; result, good, serviceable leg, function not impaired, without discoverable shortening.

CASE 42.—Mrs. West, Keokuk, Iowa, aged 70 years, sustained a fracture of the femoral neck in November, 1902. Seen first by Dr. C. A. Jenkins who referred the case to my clinic for treatment. Complete eversion of the foot existed, with one and one-half inches of shortening; crepitus slight under chloroform. She was treated by anatomic method, with recovery in four weeks, not one-half inch of shortening, walks well, with some limp. This patient's difficulty is due more to general feebleness than any inability in her leg referable to fracture.

Number of cases treated by this method so far re-

ported, 42; number giving no demonstrable shortening, 17; number with one-half inch or less of shortening, 12; number with one inch or less of shortening, 10; number of flail limbs, no union, treatment abandoned in a few days, 3; total, 42.

Cases over 80 years of age, 9; union with ability to walk well, 5; non-union, 2; paralysis from debility with great age preventing walking, 2; total, 9. Cases 70 to 80 years of age, 9; non-union, 0; good serviceable union, 7; died of brain softening, 1; total, 9. Cases 60 to 70 years of age, 8; non-union, 0; good serviceable limbs, 8. No failures to secure union under 80 years of age. No failures to secure serviceable limbs in any case under 70 years of age. Good serviceable union was obtained in 88 plus per cent.

Excluding four cases in which treatment was abandoned within four weeks, death from intercurrent malady or in which the injury is too recent to report, gives good serviceable limbs in 100 per cent.

Four specimens of bony union are herewith presented with photographs of same. These are specimens procured from patients treated by the anatomic method and previously reported by me. These specimens, the number of cases reported with useful limbs, the universal applicability of the method, ease of adjustment, comfort to the patient, stamp this as beyond any question the best method of treating fractures of the femoral neck.

## DISCUSSION.

Dr. Thos. J. Maxwell, Keokuk, Iowa—I was called to see a patient in 1870. She was 52 years of age. She was lying on her back on a pallet on the floor, with the right leg everted and very painful. I put her to bed and after a careful examination diagnosed the case as one of intracapsular fracture of the neck of the femur. I applied a long splint on the side and made extension with it, having the leg at the right length, but the hip was flat and painful. I kept her that way for a week. At the end of a week I put the leg up in an apparatus like the one we have demonstrated to you here and kept

the leg in it for six weeks, at the end of which time I took off the apparatus and found union had taken place, and shortly afterwards she could use the leg. There was no shortening. The woman lived for many years afterwards. I failed to get the bone.

There is a history connected with the bone that is circulating among you. A man in Henderson County, Illinois, in 1881, 72 years of age, fell from a wagon and broke his hip. I put the fracture up in this apparatus. I did not have pulleys, but used spools and some wire I got at the house. I put him to bed and kept him there for four weeks, then took off the dressings and told him to stay in bed for a week more, after which he might sit around, but not to use the leg for two or three months. That man was able to walk as well as he ever did. This was in the Spring of 1882. Shortly after this I came to Keokuk, and he went to live with Mr. David Rankin, his son-in-law, who was a millionaire cattleman of Tarkio, Mo. Before the old gentleman went, I said it was a question among surgeons whether the bone would ever unite; that I would like to have his bone when he was done with it, which he promised to give me. Two years ago, 22 years afterwards (I supposed he was dead long ago), at which time he was 92 years of age, while sitting in my house one evening I received a telegram at about 9 o'clock from David Rankin, saying that the old man would die before morning; come and get the bone. I telegraphed at once to a surgeon to take out the upper end of the right femur and send it to me. This was done, and you have seen the bone. This bone was fractured wholly within the capsular ligament.

My third case was Mrs. C. of Keokuk, Iowa. March, 1883, she fell on the ice, striking on the left hip; she was lying helpless in bed about one week before I saw her. Her leg was so tender that she would cry out at any attempt to examine it. She was chloroformed, removed from her bed, where she had lain in excrement from the bowels and kidneys for one week. On the sacrum was a slough two and a half by three inches, which had taken place. After a thorough cleansing she was put back in a fresh bed, with Buck's extension sufficient to draw down the leg to the proper length, and side extension, to make the trochanter as prominent as the well side, was applied. She had no more pain in the hip. I raised her to a sitting position in bed every

day until I cured the deep ulcer on the sacrum. There was no perceptible shortening of the leg; she walked without halt or limp for ten years after injury.

DR. JOHN P. LORD, Omaha, Neb.—Twenty-four years ago this winter I saw, in the practice of my preceptor—Dr. C. C. Hunt of Dixon, Ill.—a man whom he treated for fracture of the femoral neck, and inasmuch as the old gentleman lived near my father's farm, Dr. Hunt asked me to look after him. Dr. Hunt at that time introduced to me the subject of lateral extension, having used it in this case. He was a gentleman who kept abreast with everything that was going on, and I presume he obtained the idea from Dr. Maxwell, as Dixon, Ill., is not far from Keokuk, Iowa.

DR. MAXWELL—I remember reading a paper before the Military Tract Society in 1871, the year after I treated my first case, at Galesburg, Ill., and probably I met Dr. Hunt there.

DR. LORD—I was much impressed with lateral extension, and I have always carried it out in my practice to a greater or less extent. In the last few years, however, I have modified my practice in this way: I have put extension during the application of plaster; have had the assistant put the Buck's extension rope around his own body, making foot extension, thus producing complete extension under anesthesia. I have also attached about the thigh a rope and pulley for lateral extension at an angle of forty-five degrees, making outward and upward traction so that the foot would rotate into proper position. With the patient in this position the plaster is applied around the whole length of the limb up to the perineum; then a board, one-third of an inch in thickness, has been used and incorporated in the plaster, which extends just behind the trochanter major in the manner I show you (demonstrating). This board was thoroughly padded. Then the pelvis was encircled with plaster-of-paris roller, when everything was in readiness, perfect reduction of the deformity having been secured, with slight internal rotation of the foot. I have found by experience that it required slight internal rotation of the foot to produce a result without deformity. Then this piece of board, incorporated in the plaster, was crowded up to the body; this would spring the board and thus produce continuous pressure against the trochanters from behind, that is, producing upward and

internal pressure to such an extent as to hold the fracture in absolute apposition during the whole period of treatment. That has been my method in the last three or four years. I reported cases of this kind with one-fourth of an inch shortening at the Minneapolis meeting of this Association. I do not believe much attention was paid to that paper, so many of the surgeons present were operators; but, unfortunately, many of these cases are handled by general practitioners, who, so far as I am able to judge, treat them about as well as the average surgeon. I believe that this is a neglected field. Dr. Ruth is on the right track. I believe in his principle, but am so thoroughly convinced of the superiority of the plaster that I shall still continue to use it and the principle he has suggested. The functional results in three of my cases are practically perfect. In none of them is there shortening which exceeds one-third of an inch.

Dr. Ruth (closing the discussion)—I have felt that in presenting this subject it was somewhat of an imposition on the members of the profession, as they do not like to listen to the presentation of the subject of fractures. This matter has weighed on me, as I have seen so many cripples in communities, and my experience has convinced me, as it has Dr. Maxwell, as we are associated in college work, that we are not doing our duty to this unfortunate class of people. A good many of them are able for many years to render good service to their communities, and certainly they are entitled to just as much happiness as anybody after they have done most of their work, and it is our duty to keep on reporting cases treated in this way and presenting evidence. I am sorry that Dr. Grant is not here to consider the subject, because he was the one who raised the question as to whether the bone was broken at a certain meeting, and Dr. Maxwell came back crestfallen; because we had so many cases with such excellent results we were satisfied in the majority of them we were not mistaken in our diagnoses. Our own experience was not only quite extensive in these cases, but other cases had been reported to us from the outside. We have been able to gather a mass of evidence that is absolutely conclusive in regard to the treatment of these fractures. So far as the use of plaster is concerned, the method Dr. Lord is using does practically the same thing. I do not care whether one uses plaster or not; I prefer not to use it, because I have

not found it necessary. Besides, the plaster does not fit after a while, and is somewhat of a burden. It has seemed to me at least, so unnecessary. If it is helpful to him or anybody else, I have no objection to his using it. I hope the doctor will be kind enough to look after his patients and secure specimens, and that we may have some which we will be able to collect from him in a comparatively short time. I believe before long we will be able to accumulate evidence enough to snow under the whole profession of America in the interest of this unfortunate class of cripples.

# MULTIPLE LOOSE BODIES IN THE KNEE JOINT.

JOHN PRENTISS LORD, M.D.
OMAHA.

W. C. S., a barber, aged 33 years, admitted to St. Joseph's Hospital August 4, 1903. Family history negative. No history of injury nor other exciting cause. Left knee began to trouble him fourteen years ago. Had attacks of inflammation every two to four years, but later years the attacks were as often as three or four times yearly. He had knowledge of loose bodies within the joint for greater portion of time. They produced locking of the joint and inflammation followed. Recently these attacks have been much worse and great swelling and pain resulted. Upon presentation many loose bodies were easily distinguishable.

*Operation.*—August 5, 1903, an incision was made the same as for a Volkmann resection of the knee. The patella was sawn transversely, the lateral and crucial ligaments divided, which exposed the whole articulation. Four bodies were removed from above the patella. One of these was the large one of mulberry shape. Four from under and side of the patellar tendon, and two were removed from the posterior part of the joint, behind the crucial ligaments; in fact, they were posterior to the condyles, and much effort was required to dislodge them by the use of curved scissors. The bodies by the patellar tendon required removal by the scissors on account of pediculated villous attachments. In the localities of the attached bodies the synovial membrane was much thick-

ened and hyperemic. On the central surface of the inner condyle the cartilage seemed fibrillated, bruised and torn, as if by the impingement of a body between the joint

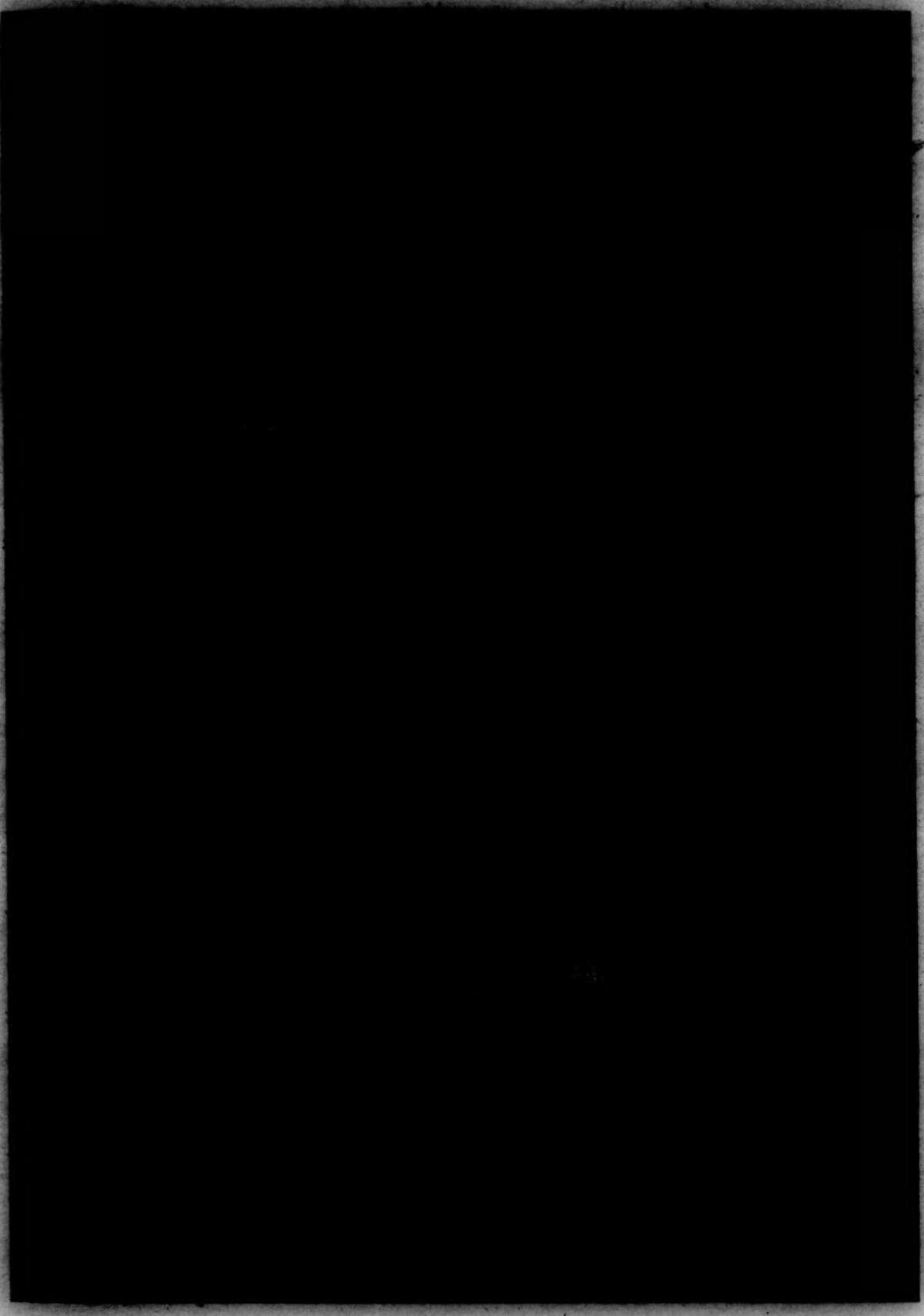


Figure 1.

surfaces. The patella was wired in the approved manner. The ligaments were sutured with chromicized catgut and the skin with plain catgut. Small gauze drains occupied the dependent angles of the incision. A dry gauze

dressing was used and a plaster-of-paris interrupted splint was applied, reaching to the perineum. Healing was primary and the patient left the hospital in good condition August 25, 1903. Returned to his work September 20, though he continued wearing the splint until October 4. Passive motion had been used upon removal of splint at night, for two weeks preceding this time. Moderate efforts only were used to restore function. Too strenuous efforts produced irritation and inflammation and this treatement could not be pushed. On account of slow resumption of flexion function the patient returned to the hospital November 22, and under chloroform forcible flexion of knee was made, but on account of apparent separation of the lateral ligaments along the line of incision, flexion was not carried beyond a right angle. A posterior splint and an ice bag were applied four days. Splint removed December 2. Condition good. December 16, 1902, patient had about 30 per cent. of flexion and no irritation in the joint. Little has been done to restore flexion function, because it was considered injudicious to put any considerable strain upon ligaments the union of which was immature. A much larger range of motion is now expected, however, as a result of the more active efforts now being used to secure function.

With the knowledge that part of these bodies were behind the condyles (and being informed also that they were the principal offenders), I did not believe it to be practicable to undertake their removal without a free exposure of the joint, believing that there would be greater danger from infection and liability of failure in securing all the bodies, if full command of the joint was not obtained. Even with this advantage considerable difficulty was encountered in removing the bodies from the posterior part of the joint.

The attention of the writer was called to this incision for exposure of the joint by the Mayo brothers, C. H. Mayo having reported this procedure for suppurating

knee joint.[1] Further experience was reported by W. J. Mayo in a paper before the American Academy of Railway Surgeons at St. Paul in September, 1900. This method has also been used by others in treating that formidable condition, endangering, as it does, lives and limbs.

The feasibility of this procedure for facilitating the successful extraction of these bodies and insuring the success of the operation was clear to me, though no precedent could be found in literature. It is, therefore, presented at this time for the consideration of this distinguished and learned body. While the writer succeeded in this single case, he is free to admit that like fortunate results might not follow sufficiently often to justify so seemingly formidable a procedure in a condition not absolutely demanding so radical a course. Discussion may reveal a better mode of procedure. It is conceded that such a mode of invasion would be rarely required, and it is not recommended when not absolutely necessitated by this condition. It has the disadvantage of precluding the early resort to manipulation so necessary in restoring the function of a joint surgically traumatized to this extent, without the result of separating the delicate union before it is sufficiently strong to withstand forced flexion. It is somewhat questionable whether complete restoration of function can be secured after such an operation. In the present case the early return of the patient to his home prevented that supervision so necessary in securing good functional results in a joint thus made liable to ankylosis.

Dr. Bernays has kindly sent this jar of bodies, taken from a knee joint. They are 428 in number and it is a pleasure to supplement my report with a case of his, which is of especial interest because of the ingenious incision used.

This patient, a man aged 46 years, was unable to give a definite history of his trouble. It began about

1. Annals of Surgery of January, 1895.

twenty-one years ago and grew worse with succeeding years. To use the exact words of Dr. Bernays: "Some thousand of villi floated in the saline solution after fill-



Figure 2.

ing up the synovial sac with it. In the distal end of the villi a wide cartilaginous nucleus could be seen, and thus the origin of the free bodies was plain to me. I cut many of them away from microscopic examination. The

result was perfect functionally, the man being enabled to throw away his crutch and cane, and is now well and free from deformity, pain or loss of function. I know that some of the villi may produce more free bodies, but there is no trouble at the present time. The incision used was a longitudinal one, through the center of the patella, which was sawn through lengthwise. By splitting the patellar and rectus tendons sufficiently wide separation was permitted to enable the doctor to remove all of the bodies."

It is not my purpose to discuss the pathology of loose bodies in the knee joint more than to say that the bodies in both of these cases were evidently developed from hypertrophied villi, which, in my opinion, cause these bodies most frequently. Those caused by trauma and separation necrosis, according to some authors, must be most rare. In fact, it is my opinion that these are more ingenious theories than demonstrated actualities.

## DISCUSSION.

DR. THOMAS J. MAXWELL, Keokuk, Iowa—These cases of loose bodies in the knee joint are not only interesting to the surgeon, but to the physician. I had occasion to remove some not long ago in my office. I failed to locate them generally. If I can do this before opening into the joint with a sharp instrument, it has been my practice to do so. But in this case I made an opening just on the inner side of the patella, and was very much disappointed because I could not catch the bodies with forceps; but on flexing and extending the leg some of them shot out through the opening. A catgut suture was used to close the wound and a posterior splint was applied. With regard to the incision, I think the incision which the essayist made, the one which Senn recommends for atypical resection of the joint, is a good one. Senn's incision begins above the patella, reflecting the flap downward and sawing across the patella, thus getting into the joint.

DR. S. C. BEEDE, David City, Neb.—As evidence of the origin of these loose bodies, I wish to cite one case operated on in 1898. In this case there were several

loose bodies, some large, and a number of them small, which were attached to villi in the upper portion of the synovial sac. An incision was made on either side of the patellar ligament and above the patella, on the inner side of the insertion of the quadriceps extensor. The largest of these bodies was the size of a small hickory nut, and the smallest the size of a pea. The functional result was perfect. There was no difficulty in finding and removing them after making this extensive incision.

DR. LORD (closing the discussion)—I purposely omitted speaking of the ordinary operations for the removal of loose bodies from the knee joint, because that is a comparatively common matter. They can be removed by incisions beside the patella, or perhaps by opening the joint from one side. Considering the history of this case and the peculiar location of the two bodies posterior to the condyles, it made me think I would fail if I undertook anything less radical. My principal object in bringing this subject before you was to learn some less radical method which would enable one to secure the bodies so unfortunately situated as these were. I realize that this is a rare condition, and that most of the bodies can be removed through a button-hole incision, preferably after the method advocated by Dr. Maxwell in his discussion. Dr. Maxwell spoke of removing these bodies in his office. I have so much respect for the knee joint that I would rather undertake an abdominal operation in my office than the removal of foreign bodies from the knee joint, especially if I anticipated considerable difficulty in securing them. I do not think it is a wise practice to do it in the office.

I realize that there are other means by which these bodies may be formed, but just as I have said, they are very rarely met with, but if we study the embryology and histology of the knee joint, and recognize that the villi there are practically normal, these float readily if saline solution is used; and when we consider that hypertrophy of these villi may make it possible for these foreign bodies, if they become sufficiently large, to interfere with the mechanism of the joint, we can understand that atrophy will cause separation, and thus they may limit the free movement of the joint. This indicates that this is the most rational and most frequent method of their production. I regret that the brethren have not a larger amount of experience to offer in this

discussion, in order that I might have gotten more out of it myself.

DR. FERGUSON—Did you examine the bodies microscopically to see whether there was any connection with tuberculosis, as they are supposed to be of tubercular origin?

DR. LORD—No, sir; I did not.

# SURGICAL TREATMENT OF PULMONARY ABSCESS.

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As the surgical treatment of pulmonary abscess still presents many difficulties to be overcome and problems for solution, the personal experience of operators in this line of work, even though that experience is limited, will be of assistance in formulating rules for future guidance.

No résumé of the literature will be attempted, as several scholarly articles published during the past two years have anticipated and rendered unnecessary such a procedure.

Experience has demonstrated that multiple lung abscesses and those accompanied by bronchiectasis are, as a rule, not benefited by operation. Tubercular abscesses and those due to the presence of a foreign body in the lung will not be considered, as they present complications placing them in classes by themselves, and with their surgical treatment I have had no experience. Metastatic and embolic lung abscesses are multiple and not amenable to surgical treatment.

This leaves for our consideration those cases of single pulmonary abscesses the sequelæ of pneumonia, with which may also be included those rare cases due to rupture into the lung of abscesses of the liver, those of appendicular origin, etc. These may be roughly divided into two classes, acute and chronic, and may or may not be accompanied by gangrene and bronchiectasis. As

the mortality following surgical treatment of cases so complicated is fully twice as great as that of the simple cases, it is urged that these patients be given the better chance which is offered by timely surgical intervention.

With the general symptoms and diagnosis of pulmonary abscess there exists equally general familiarity. The surgeon will not, as a rule, see these cases until the diagnosis has been made by the internist, who has been in attendance and will be called on not so much to make a diagnosis of abscess as to determine its exact location, with the hope of surgical relief. This may be at times extremely difficulty and often impossible.

In two cases which I have seen and which will be referred to again, although the patients presented all the symptoms common to abscess of the lung and the physician in attendance, as well as I, was satisfied of its existence, we were only able to locate it in the one case at the autopsy, and in the other suffered the indignity of having our diagnosis confirmed and our failure to locate the abscess accentuated by its rupture into the pleural cavity with empyema as the penalty.

While in many quarters attempts to locate the abscess by aspiration have been denounced as unsafe and injudicious, my limited experience has taught me the inadvisability of attempting to open an abscess of the lung without the aspirator as a guide. The physical signs common to this condition in many cases are alone not sufficient to render its exact localization possible, and, while we may be satisfied that in a given instance the lung contains an abscess and from the usual methods of examination have decided as to its location, this point should be positively corroborated by the aspirator before proceeding with the operation. In Case 2, reported below, I was so certain of the existence of an abscess in the lower lobe of the left lung that, despite my failure to locate it with the aspirator, I exposed the suspected area and subjected the patient to a

severe and prolonged operation during my fruitless search for the pus. Fortunately, in the greater number of these cases, pleural adhesions are present so that unless repeated punctures are made, some of which may be beyond the area so protected, the danger of extravasation is slight.

In cases where the history and physical signs lead us to suspect pulmonary abscess, the localization must be made as accurately as possible by the usual and well-understood methods of examination. The patients should then be prepared for operation, and under local anesthesia an attempt to aspirate the abscess is made. The aspirator, which should carry a short needle of good caliber, should be introduced at the center of the suspected area, as at this point the protecting adhesions are most likely to be present. If pus is not found at this first attempt the needle should not be withdrawn completely from the lung, but as nearly so as possible and reinserted in various directions until it enters the cavity. This will prevent the multiple punctures of the pleura and diminishes the danger of extravasation of septic material into the pleural cavity.

When pus is found the needle should be left as a guide and chloroform administered, it being in the class of cases under consideration preferable to ether. A free incision, rendered so by the partial resection of at least two ribs, should then be made, well exposing the diseased area.

Pleural adhesions will usually be found present over the surface sufficiently large for the purpose. If absent the pleura must be sutured with catgut, using the common "back stitch." The suture line is then reinforced with iodoform gauze packing and the operation may be finished at the one sitting. This walling off of the pleural cavity may usually be effectually accomplished as above described and is preferable to postponing the second part of the operation in these weakened patients.

If, owing to the extreme friability of these tissues, such suturing is impossible, because of the constant tendency of the stitches to tear out, the walling off must be accomplished by gauze packing and the operation deferred until sufficiently firm adhesions have formed.

As, in the absence of adhesions, collapse of the lung may occur, it is advisable to have at hand for immediate use the Fell-O'Dwyer apparatus.

For the purpose of opening the cavity in the lung I prefer a probe-pointed pair of coarse dressing forceps, which are introduced alongside the needle into the cavity and the blades slightly separated. After the pus has been evacuated the opening may be cautiously enlarged by still further spreading the forceps, until of sufficient size to permit the examination of the cavity by the finger. Bands of tissue running across these cavities frequently carry large vessels and must not be carelessly torn loose.

The cavity should now be thoroughly wiped out with pledgets of gauze. Irrigation should never be employed. Tubular or gauze drainage have both been used. I use a flaring, cigarette, iodoform gauze drain, that is, one so constructed that the rubber tissue comes not quite to the end of the gauze, which may be spread to loosely fill the cavity, the rubber preventing the sticking of the gauze to the external portion of the wound. This is changed as the case demands, and must never be permitted to act as a "stopper," "corking up" the wound secretions. This device has answered every purpose and has been better tolerated than the tubes.

If gangrene is present the gangrenous tissue should be snipped away with scissors as carefully and completely as possible, the rest of the treatment differing in no way from that above described. The after-treatment is governed by the usual surgical principles.

To return to the aspirator. If after careful, thorough and systematic search pus is not found by this in-

strument, further operative interference should be abandoned, so that the patient may be spared the danger and uncertainty which it entails. I report the following cases:

CASE 1.—H. C., boy, aged 12. I was asked to see this boy by his attending physician, who had already made a diagnosis of abscess of the lung following a severe lobar pneumonia seated in the upper portion of the left lung. The patient presented the history common to such cases. Examination disclosed the physical signs of an abscess occupying the middle external portion of the upper lobe. The patient was prepared for operation, and under local anesthesia a good-sized aspirating needle was introduced at the center of the suspected area, in the axillary line. The first puncture was negative, but after four or five attempts, slightly changing the direction of the point without completely withdrawing it from the lung, pus was encountered. The needle was left *in situ* and a U-shaped flap raised. This flap was buttonholed to permit of its retraction over the needle and this opening, being subsequently enlarged, was employed for drainage.

Portions of two ribs (about two inches) were then resected. The pleura being adherent a large, probe-pointed dressing forceps was then passed in alongside of the needle, and at the depth of an inch entered the abscess cavity.

About two and one-half ounces of pus were evacuated. The forceps were then spread slowly until it was possible to pass the finger into the cavity, which was then wiped out with gauze. Hemorrhage was slight. The cigarette drain, constructed as described above, was then introduced and brought out through the buttonhole in the center of the flap. The flap was then sutured in place and moist dressings applied. After seventy-two hours the drain was removed and a fresh one inserted daily thereafter. The cavity closed rapidly and the boy made an uneventful convalescence.

The operation in this case has been described rather at length, as it was closely followed in the remaining cases and will not be again detailed. Especial attention is called to the buttonholing of the flap, which allows of its withdrawal over the needle, furnishes ample drainage and permits of the restoration of the parts by suture.

CASE 2.—Mrs. G., aged 37, was seen with her physician, who had diagnosed pulmonary abscess subsequent to pneumonia. The history seemed typical of this condition, and examination revealed the usual physical signs of an abscess in the lower portion of the lower lobe of the right lung. Careful and prolonged search with the aspirator failed to find pus. As we were certain the abscess existed, and thought the pus might be too thick to enter the needle, the lung was exposed as in the preceding case. Pleura was adherent and a pair of dressing forceps was thrust into the lung at the center of the suspected area. No cavity was encountered, but a profuse hemorrhage ensued, which was controlled with difficulty by gauze packing and the wound closed. The patient's symptoms were all aggravated after the operation until her death, which occurred ten days later. At the autopsy a large abscess cavity was found occupying the lower lobe of the lung posterior and external to the spot suspected by us. I consider that I made a serious mistake in persisting in the attempt to give operative relief after failing to locate the abscess with the aspirator.

SASE 3.—Mrs. H., aged 40. I had made a hysterectomy on this woman some weeks previously, removing a large myomatous uterus. The third day following the operation she developed a lobar pneumonia involving the base of the right lung. This pursued a rather severe course, and was not marked by the usual crisis. Soon symptoms of sepsis developed, and we were forced to the conclusion that pulmonary abscess existed as the signs of its presence became more pronounced. Several attempts were made by the consultant and myself to

locate the abscess by the usual examination and with the aspirator, with failure each time. After two weeks of this uncertainty the abscess ruptured into the pleural cavity, this accident being rapidly followed by empyema. The usual surgical treatment was immediately employed, and after a most prolonged and tedious illness she made a good recovery. My chagrin at failing to locate the abscess in this and the preceding case may be better imagined than described.

CASE 4.—John B., aged 22, was seen with his physician, who had made the diagnosis of abscess of the lung secondary to pneumonia. The patient presented the usual history of such cases. Examination pointed to the presence of an abscess in the lower lobe of the left lung. After the usual preparation an aspirator was inserted about the middle of the lobe and slightly anterior to the axillary line. At the first attempt pus was found. The operation was then proceeded with as in Case 1, the pleura being adherent. The cavity was somewhat larger than in the first case, and contained about three and one-half ounces of pus. Subsequent treatment was same as Case 1. Recovery was apparently perfect.

As the treatment of these cases by other than surgical methods promises so little, and as the complications of gangrene, empyema and bronchiectasis so seriously increase the mortality, even in the hands of the best operators, it would appear that a plea made for early operative relief of patients suffering with pulmonary abscess is not inconsistent with the facts.

## DISCUSSION.

DR. T. E. POTTER, St. Joseph, Mo.—In the operation for pulmonary abscess I think there ought to be an opening made through the thoracic cavity, resecting two ribs, and in that way the operator can very much more easily get at the abscess. To aspirate through the wall, without making a large opening, would be fraught with more or less danger, because if you aspirate and should only get a part of the pus out, the remaining pus

might gradually find its way into the pleural cavity and set up an empyema. To resect two or three ribs is not such a dangerous operation, and by so doing the operator is able, without aspirating the lung in three or four different places, to find the abscess, and in this way I think he can do much better work.

Dr. Thomas J. Maxwell, Keokuk, Iowa—I think Dr. Potter misunderstood the method pursued by the essayist. If I understand the matter correctly, aspiration was resorted to merely for the purpose of diagnosis, and not for the purpose of evacuating the abscess. He afterward had to resect two ribs, and went in with forceps and dilated.

Dr. Homer M. Thomas, Chicago (by invitation)—I think Dr. Knott should be congratulated upon the very fair and conservative presentation he has made of the interesting subject of pulmonary abscess. The uncertainties of physical diagnosis associated with conditions of the lungs, no matter how thoroughly studied or how peristently followed, will render those who have made a study of physical diagnosis at least guarded as to their ability to locate positively and accurately pulmonary abscess. Therefore, the proposition of the Doctor, to resort to free aspiration for the purpose of determining the location of the abscess, is not only highly commendable, but it is in line with the best conservative surgical thought. The fact that nature establishes extensive pleural adhesions in the lungs as a protective barrier against the progress and extension of pulmonary abscesses, is a condition of safety for the operator, as well as for the patient, in preventing the extension of the septic material, which is the product of the pulmonary abscess.

While the essayist did not take up the subject of bronchiectatic abscesses, if he and the Chair will permit a slight deviation in the discussion of this matter, I would like to refer to the vast utility and surgical benefit that arise from the use of nitrogen gas in the mechanical evacuation of bronchiectatic abscesses. I am not in sympathy with the somewhat laudatory claims that have been promulgated to the profession as to the benefit of nitrogen gas in the relief or cure of pulmonary tuberculosis. But there is a most beautiful mechanical principle to be used in the use of nitrogen gas, where there is free communication with the bronchus just be-

low the bronchiectatic cavity, or at its upper margin, where the opening is free and the introduction of the gas guarded as to quantity and pressure. I am personally familiar with three cases where the entire contents of the cavity were immediately expelled per orem, and obliteration of the cavity through the continuance of the mechanical pressure of the gas practically secured.

It would appear to the medical internist that resection of the ribs is not the simple surgical procedure that has been suggested. The few cases I have seen have always been attended with marked cicatricial contraction of the lung, and, therefore, marked loss of pulmonary capacity at the point of operation. There has been suggested recently a method of continuous drainage of these abscesses by the production of a vacuum. It was first brought to my attention through a paper by Dr. Van Hook of Chicago, in which the principle of a water motor was attached in homes where any water pressure was used. This pump was kept in continuous motion, and by a judicious arrangement of tubing a more or less continuous vacuum was produced within the pleural cavity. In this way retraction of the lung was largely prevented, and with the process of healing the tendency of the lung to follow down into the pleural cavity was much assisted and accelerated.

Dr. John P. Lord, Omaha, Neb.—I wish to report a case of pulmonary abscesses on which I operated, but we were afraid to use a general anesthetic because the patient was continually expectorating quantities of pus. We therefore employed cocain anesthesia, injecting it in the region of the intercostal nerves posterior to the proposed line of incision for the resection of the ribs, and by further fortifying the patient with a free drink of whiskey, the operation was performed with great facility. I think it valuable in such cases. This man had multiple pulmonary abscesses which I drained, but he subsequently died. The matter of cocain anesthesia is what I wish to emphasize.

Dr. D. W. Basham, Wichita, Kans.—Hypostasis plays an important rôle in the location of these pulmonary abscesses. A man with pneumonia usually lies on his back, and consequently abscess usually forms in the posterior part of the lung, and I think if we will remember that, it will facilitate materially in finding the abscess. I believe these abscesses ought to be opened

posteriorly. I have operated twice this year for pulmonary abscess, in one of which I opened posteriorly; in the other, on the side, in the axillary line. In that case I had the misfortune to open in the wrong place, too low down. I passed my finger into the pleura, located the adhesions, then resected the third and fourth ribs, and found the abscess.

Dr. John E. Summers, Jr., Omaha, Neb.—Within a year, I think, Dr. Gifford of Omaha had a case of inflammation of the mastoid secondary to middle ear disease, involving the sigmoid sinus. He requested me to tie the internal jugular vein. I did so, and inserted a tube in the vein toward the mastoid, in this way attempting to limit the infection. In spite of this there developed a gangrenous abscess of the lung, which was in a diagnostic way indicated by the usual signs of abscess, foul breath and general debility. The young man was very ill. It took, as Dr. Knott has suggested and emphasized properly, a number of examinations with the needle to determine accurately the location of the abscess. There were so many adhesions, there was so much inflammation, that in spite of numerous punctures, it was only after the sixth or seventh puncture that the abscess was revealed, and the ordinary procedure which has been spoken of, adopted and followed out successfully. I want to emphasize the point which I think was well taken by the Doctor, that the incision should never be made until it has been determined previously by the needle that we have reached the center or at least some part of the abscess cavity. On several occasions I have tried different methods, after failing to find the location of the abscess with the needle, and in every instance temporarily failed. I think the point which he has emphasized is very well taken. We should know before we cut what we are going to find when we cut.

Dr. E. M. Sutton, Peoria, Ill.—I have had a similar experience to that related in regard to opening these pulmonary abscesses, and the point made by one of the speakers is important, making an exploratory puncture to the rear of the axillary line because of the gravitation of the abscess to the rear of the chest, the patient lying on his back so constantly. In one case the patient had suffered from appendicitis, and the seat of trouble was transferred from the appendix to the chest during the sixth and seventh weeks. Repeated examinations of the

chest failed to reveal an abscess which was supposed to be forming. Finally there was a discharge of fecal pus through the mouth by coughing, which made it more positive that the abscess had ruptured into a bronchus. Repeated exploratory punctures had been made; I think I made nine or ten over the area of dullness in front and to the side of the chest. When I had the patient taken to the hospital and made the first puncture to the rear of the chest, between the seventh and eighth costal cartilages, obtained pus, opened and drained after resecting the ribs, the patient recovered.

Acting according to the essayist's directions, I at once opened into what was supposed to be an abscess, because with the aspirating needle a few drops of pus were withdrawn. On opening the chest wall there were no adhesions; the lung immediately collapsed, and the patient lived for a short time only—twenty-four hours. We got her off the table, but we considered ourselves fortunate that she did not die instantly when collapse of the lungs occurred. At the autopsy there were multiple abscesses found throughout the lungs. We had succeeded in aspirating one small abscess.

Dr. D. S. Fairchild, Des Moines Iowa—In 1890 or 1891, I forget which, a case of abscess of the lung came under my observation. The physical signs showed clearly it was in the posterior surface. I was obliged to make five punctures with the aspirating needle before I was able to locate the abscess. The needle was withdrawn completely each time, because it was necessary to make an individual puncture before we found the abscess.

In another case that came under my observation a few years ago there were two abscesses, one in the anterior surface of the lung, the other in the posterior. In one it was found that the pleural surface was not adherent. This was due to the fact that there was a certain amount of fluid between the two serous surfaces, and the two pleuræ had united. I did not feel willing to trust to the stitching of the pleural surfaces together, but preferred to pack with iodoform gauze and wait a few days until adhesions had formed, fearing sutures would not hold. The abscess was drained after making an incision in the anterior surface. Ten days later I discovered another abscess from the symptoms presented. An incision was made in the posterior surface and the abscess drained in the same manner as in the previous case.

DR. KNOTT (closing the discussion)—The first speaker (Dr. Potter) misunderstood my remarks in regard to the aspirator. The aspirator was recommended simply as a diagnostic aid, but was not to be relied on as the operating agent, locating the abscess with it, then with the aspirator as a guide evacuating it through a free incision. With reference to bronchiectatic cavities, referred to by one of the speakers in the discussion (Dr. Thomas), they are beyond surgical relief. Being multiple and too numerously situated, so far as I know, invariably the results of attempts to afford surgical relief have been failures. The point made by one of the speakers regarding the gravitation of these abscesses toward the posterior part of the lung and the value of searching that portion of the lung for abscess is a good one, and doubtless a very efficient aid in the location of the abscess.

I expected to hear some one speak about the *x*-ray in these cases. In reviewing the literature of the subject, I find more or less value is attributed to the *x*-ray in the examination for and diagnosis of pulmonary abscess. In two of my cases it was an absolute failure. I did not mention the *x*-ray, for the reason that I expected some one to bring it up. Inasmuch as it was not mentioned, I inferred that it has not been of any particular value to any of the rest of you.

One gentleman reported a case in which the pleura was opened, with a collapse of the lung, in which there were no adhesions. I do not pose as an authority on this subject, because my experience is limited, but in the cases I have had it was easy to tell whether adhesions existed before opening the pleura. You can tell by palpation and inspection of the pleura before making incision as to whether it is adherent to the lung. Palpation will reveal whether or not it is adherent to the external surface of the lung, and unless one is absolutely certain that such adhesions exist, the pleura should not be opened under any circumstances. The only wonder is the patient did not die on the table from collapse and the symptoms incident to it. It is extremely dangerous to open the pleura in one of those cases in which adhesions do not exist.

Dr. Fairchild's case of two abscesses in the lung was interesting, and I think he is entitled to great credit for having evacuated one abscess, then locating the other,

and also relieving it. As a rule, the surgical treatment of pulmonary abscesses must be confined to single abscesses. If they are multiple, we will not be able to drain them all, and operation accomplishes only partial relief and does no ultimate good to the patient.

I hoped some gentleman would have discussed the technic of the operation. I have been unable to find any extended description of it in any of the literature at my disposal, and in the few cases I have seen I have attempted to elaborate it, so far as I could. One important thing, as mentioned in the paper, is not to withdraw the needle completely from the pleura. Make your aspiration in one direction, but do not withdraw the needle from the pleura. Draw it out as far as you may without entirely disengaging it, insert it in another direction, or in many directions, by so doing making as many punctures or explorations through one pleural puncture as possible. In this way you diminish danger of extravasation, not being so likely to get outside the limiting adhesions which will be formed.

DR. POTTER—When you aspirate and find an abscess, how can you tell whether you have a single or multiple abscess?

DR. KNOTT—Physical signs are the only guide, and even with these I do not claim that we can tell positively whether we have a single abscess to deal with or multiple abscesses. In a case where you have gone sufficiently far as to aspirate, it may be taken for granted that the patient has a single pulmonary abscess rather than multiple ones.

As regards buttonholing of the flap, it prevents withdrawal of the needle, and possibly we lose the cavity and are unable to find it again; at the same time, a free opening, which permits of retraction of the flap over the base of the needle, is large enough for drainage, and the parts may be better restored than by leaving an entire flap, as large as the palm of the hand in the ordinary case, entirely open. The cigarette drain in these cases is better than tubular drainage, because in some we are confronted with the danger of hemorrhage, requiring the use of iodoform gauze packing to control it. It is better than a tube. In these two cases the tube was tried, but the cigarette drain is better tolerated and gives better results than the tube.

# RESECTION OF ARTERIES AND END-TO-END UNION. EXPERIMENTAL RESEARCH.

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The end-to-end union of the severed ends of arteries has been undertaken upon the human subject in a few instances, and some extensive and creditable experimental work has been done upon the lower animals. The results have been nearly universal failures, as far as permanently re-establishing the circulation of the blood through the reunited arteries. The causes of failure were the occurrence of thrombosis and an obliterating endarteritis.

Assmann was probably the first to attempt experimental work upon the arteries in the lower animals. In 1773 he performed two experiments, both resulting unfavorably on account of an obliterating endarteritis. Gluck made nineteen experiments with suture, claiming that his failures were due to hemorrhage through the needle punctures. He devised aluminum and ivory clamps for the purpose of applying them to longitudinal incisions in arteries, and reported one success with the ivory clamp. In 1887 von Horoch of Vienna reported six experiments in the suture of arteries, and one resection and end-to-end union, with thrombosis in each experiment. The experimental work of Jassinowski and Bruci in 1889, and as well Tansini and Muscatello in suturing incisions in arteries, is worthy of mention. In 1897 J. B. Murphy of Chicago reported a series of experimental cases upon the sheep, dog and calf, 34 in number, as

follows: Resections and transverse sections of the common carotids, abdominal aorta, the femoral arteries and jugular vein were made in 21 experimental cases with the following results: Thrombosis occurred in 14; infection and non-union in 1; progressive obliterating endarteritis in 1; partial occlusion in 3; slight thickening in 1; total occlusion in 1.

Longitudinal, transverse and oblique incisions were made in the abdominal aorta, the common carotids, the femorals, the iliac and the right jugular vein and closed with suture in eleven cases with the following results: Slight diminution in the caliber of the vessel, 1; one-third diminution in the caliber of the vessel, 2; non-union, 1; thrombosis, 3; occlusion of the caliber of the vessel, 2; fatal hemorrhage, 1; normal caliber of the vessel maintained, 1. A V-shaped incision was made one-fourth of an inch long on each side of the right common carotid and closed with continuous sutures, which resulted in thrombosis.

A semilunar piece one-half inch long, involving one-half of the circumference of the left jugular vein, was excised. The opening was closed with a continuous oxilated waxed silk suture. A thickened inflammatory cord existed at the site of the suture; about one-fourth of the caliber of the vein was patulous.

The methods employed by Murphy in uniting the cut ends of the artery in resections and transverse sections of arteries were end-to-end suture, the sutures passing through all of the coats of the vessel, and the invagination method, the proximal end invaginated into the distal end, the sutures passing through the outer two coats only. The postmortems in these experiments were made at intervals of from four to thirty-five days, in cases where the subject did not die as a result of the experiment; so that the probable length of time intervening between the time of operation and the formation of complete thrombosis was not determined by his experiments. It seems reasonable to conclude that the problem of

successfully reuniting the severed ends of arteries and permanently re-establishing the circulation of the blood has not been solved by the above experiments.

For the purpose of determining the possibility of successfully reuniting the severed ends of arteries and permanently re-establishing the circulation of the blood, I have made the following experiments:

EXPERIMENT 1. (April 7, 1903.)—Dog, a black and white shepherd, weight forty-five pounds. Resection of one-third of an inch of the left femoral artery. Billroth clamps were placed on the artery. The adventitia was dissected back for one-half of an inch. The abraded area was removed to within one-sixth of an inch of the cuff of adventitia. The distal end of the artery was sutured to the abraded stump with four through-and-through sutures of silk, the sutures passing through all the coats of the distal end of the artery and through the abraded stump. The adventitia was then drawn over the line of suture and made secure by four interrupted sutures passed through the adventitia of the cuff into the adventitia of the distal portion of the artery. When the clamps were removed from the artery no hemorrhage occurred, and the artery could be felt pulsating below the site of union. The dog was allowed the freedom of the ward at the end of twenty-four hours. He walked without limping. A little swelling occurred about the knee. At the end of fourteen days a hemorrhage occurred from the wound, which had not entirely healed. The dog was prepared for operation and the wound opened. A slight infection of the external wound was observed, which had reached to some extent the deeper structures. Union was good. The artery was completely thrombosed. The collateral branches were noticeably enlarged. The hemorrhage occurred one inch above the site of union, at the point where the clamp had been placed in making the resection. The artery was ligated above and below,

and two inches of the artery removed. The dog made a good recovery following the ligation.

EXPERIMENT 2. (April 8, 1903.) Dog, weight fifty pounds. Resection of one-third inch of the left femoral artery. The same technic was followed as in Experiment 1. Dog reoperated on at the end of twenty-one days. Union was good. No evidence of infection. The artery was thrombosed, no blood passing through it. The collateral branches were enlarged.

EXPERIMENT 3. (April 10, 1903.) Dog, weight seventy pounds. Resection of one-third inch of the left femoral artery. The same technic was followed as in Experiments 1 and 2. Dog was reoperated on April 20, 1903. No macroscopic evidence of infection. Union good. The artery was thrombosed.

EXPERIMENT 4. (April 11, 1903.)—A bird dog, weight forty pounds. Resection of one-third inch of the right femoral artery. The same technic was followed as in the above reported experiments. Dog reoperated on April 30. The wound was completely healed. The artery was exposed at the site of union. The sheath was adherent to the adventitia. The artery was completely thrombosed.

EXPERIMENT 5. (April 13, 1903.)—A brown bird dog, weight thirty-eight pounds. Resection of one-third inch of the left femoral artery. The same technic was followed as in the above experiments. Dog reoperated on May 11, 1903. The wound was opened and found to be infected. A sinus could be traced down to the artery and a pus cavity found surrounding the artery. The artery was thrombosed and softened.

EXPERIMENT 6. (April 15, 1903.)—Dog, weight fifty pounds. Resection of one-half inch of left femoral artery. The adventitia was dissected back on the distal portion of the artery. The abraded area was resected to within one-sixth of an inch of the cuff of adventitia. Two suspension loops were placed through the abraded

stump, and the stump was split for about one-twelfth of an inch. Two invagination sutures with a double thread were fastened in the proximal artery on either side, about one-fourth of an inch from the cut end. These sutures were placed through the adventia into the media, but did not penetrate the intima. These sutures were passed through the adventitia at points directly opposite and within one-twelfth of an inch of the cut end of the artery of the proximal end, then into the lumen of the artery of the distal end and brought out just below the cuff of adventitia. While an assistant made traction on the suspension loops of the stump, these invagination sutures were tightened, invaginating the proximal end of the artery into the distal end. The invaginating ligatures were then, in turn, tied. Four sutures were placed through the stump into the adventitia and media of the proximal artery, uniting the stump to the proximal artery. The cuff of adventitia was now rolled over these sutures and made secure by four sutures being passed through the cuff into the adventitia of the proximal portion of the artery. It will be observed that none of the sutures should be exposed to the blood current by this method. Dog reoperated on June 17, 1903. Union was good. Complete thrombosis.

EXPERIMENT 7. (April 16, 1903.)—Dog, weight thirty pounds. Resection of the left femoral artery. About one-half inch of the artery was resected and the same technic as in Experiment 6 was employed. The dog was reoperated on May 15. The wound had completely healed and there was no evidence of infection. The artery appeared as a fibrous cord. Union was good, but no pulsation could be felt. About one inch of the artery was removed. There was no thrombus, but the artery was completely obliterated from endarteritis, which was complete at the site of union, tapering on either side, so that at the two points where the artery was severed one-half inch on either side of the site of

union the artery was reduced at least one-half its normal diameter.

EXPERIMENT 8. (April 16.)—Dog, a female, weight forty-two pounds. Resection of one-half inch of the right femoral artery. The same technic as practiced in Experiments 6 and 7 was followed. Reoperated on May 16. A sinus led down to the artery and a pus cavity was found. The artery was completely thrombosed. Union had not taken place.

EXPERIMENT 9. (April 26.)—Dog, weight fifty-eight pounds. A median incision was made in the abdomen and the intestines were held to one side by means of a large gauze pad. The postparietal peritoneum was opened for about three inches, exposing the abdominal aorta. A Billroth clamp was placed about two and one-half inches above the iliac bifurcation and one just above the bifurcation. A transverse incision, completely severing the aorta, was made, followed by an end-to-end approximation. The operative technic used in Experiments 1, 2, 3, 4 and 5 was followed. The dog appeared well at the end of twenty-four hours, his temperature being 100 F., taken per rectum. He drank milk and was able to walk about the yard and did not seem to be in pain. At the end of forty-eight hours he still appeared to be free of pain and drank milk and water. Temperature 100 F. At the end of three days the dog did not appear well, was in pain, refused milk, but drank considerable water. Temperature 103 F., which continued to the time of his death, which occurred at the end of five and one-half days. The abdomen was found filled with blood and pus. A large clot was found adherent to the line of suture in the postperitoneum, which was continuous with a clot surrounding the artery and into the artery. The clot had dissected the postparietal peritoneum, extending to, and above the kidneys. Union had not taken place.

EXPERIMENT 10. (April 28.)—Dog, weight forty-six

pounds. A longitudinal incision one and one-half centimeters long was made in the abdominal aorta and closed with a continuous suture of silk passed through all of the coats of the artery. The dog died at the end of fourteen days. The artery was thrombosed. Union was imperfect. A large blood clot surrounded the artery.

EXPERIMENT 11. (May 15).—Dog, weight thirty pounds. A transverse incision was made, completely severing the abdominal aorta. The same technic was followed as in Experiment 9. The dog died at the end of six and one-half days. The abdomen was filled with blood. The artery was thrombosed. Union had not taken place.

EXPERIMENT 12. (May 15.)—Dog, weight thirty-two pounds. A resection of one-half inch of the left common carotid was made. The proximal end of the artery was invaginated into the distal end, the same technic being followed as in Experiment 6. Dog was reoperated on May 30. The artery was thrombosed. Union was good. About one inch of the artery was removed; the cut ends were ligated. The dog made a good recovery, no unpleasant symptoms following the ligation.

EXPERIMENT 13. (May 17.)—Dog, weight sixty pounds. Resection of one-half inch of the right common carotid artery was made. The adventitia was not peeled back. Two invagination sutures were passed, one on either side of the proximal end of the artery within one-fourth of an inch of its severed end, passing through adventitia into the media and tied. The sutures were passed in like manner into the distal end of the artery, the sutures not penetrating deeper than the media, and left untied. Two suspension loops were placed in the distal end of the artery directly opposite each other. The distal end of the artery was then split for about one-tenth of an inch. The suspension loops were held taut by an assistant, while the invagination sutures were drawn upon and the proximal end of the

artery was directed with a pair of smooth tissue forceps into the distal end. The invagination sutures were then, in turn, tied. The suspension loops were removed and eight sutures were passed through the distal end of the artery and through the adventitia and media of the underlying proximal end. While this method is a little difficult of execution, certainly less damage is done to the intima, and none of the sutures have penetrated it. Dog reoperated on June 17. Union was good, but complete thrombosis.

EXPERIMENT 14. (May 17.) Dog, weight sixty-five pounds. Resection of the right common carotid. The same technic was followed as in Experiment 13. Dog reoperated on June 17. A sinus extended well down to the artery and a pus cavity was found. The artery was infected and thrombosed.

EXPERIMENT 15. (May 19.)—Dog, weight fifty pounds. Resection of the left common carotid. The same technic was followed as in Experiments 13 and 14. Dog reoperated on June 17. The artery was completely thrombosed.

EXPERIMENT 16. (September 23.)—Dog, weight forty pounds. Transverse section of the left common carotid was made. The proximal and the distal ends of the artery were split for one-sixteenth of an inch. A cuff was now made on the proximal and distal ends of the artery of all its coats, turned back for a distance of one-sixth of an inch, and secured by suturing. These sutures passed through the adventitia into the media. The ends of the artery were now united by the placing of mattress sutures passed through the cuffs, thus bringing intima to intima. Dog reoperated on October 3. The wound was infected and the artery was completely thrombosed. Union was good; none of the sutures were visible within the artery. The above technic was followed in nine additional cases operated upon on the following dates: September 30, October 2, 3, 4, 6, 7, 9, 10 and 11. Eight of these operations were resections of

the left common carotids and one, transverse section of the abdominal aorta. Eight of them were reoperated on and the site of union examined at periods of time following the primary operation of from twenty-four hours to four days. Thrombosis occurred in each experiment. In Nos. 19 and 21 the blood was found to be passing through the site of union at the end of three days, there being found a small thrombus in each which had not entirely obstructed the arteries. In the tenth case done by the last mentioned method, which is Experiment 25, a transverse section was made in the abdominal aorta. The postmortem was held on the fifth day following operation, the dog dying at the end of four days. The artery was completely thrombosed. Union was good and there was no evidence of peritonitis.

EXPERIMENT 26. (October 12.)—Dog, weight fifty pounds. A longitudinal incision two cm. long was made in the abdominal aorta and closed in the following manner: Six of the smallest sized cambric needles were passed from without in, and from within out, through the edges of the wound in the artery and made secure with figure-of-eight sutures passed around each needle. The dog died October 20. Postmortem showed complete thrombosis.

EXPERIMENT 27. (October 14.)—Dog, weight thirty pounds. Resection of the left common carotid. The double cuff was made as in the preceding resections, with the exception that eight of the smallest sized cambric needles were used to unite the ends of the artery, instead of the suture. These needles were passed from without in, and from within out, through the proximal cuff and from without in, and from within out, through the distal cuff. A figure-of-eight suture was placed around each needle. Dog reoperated on October 16. Complete thrombosis. The above technic was followed in Experiments 28, 29 and 30, performed October 16, 19 and 20, with the occurrence of thrombosis in each experiment at the end of seventy-two hours.

EXPERIMENT 31. (October 21.)—Dog, weight thirty pounds. Transverse section of left common carotid. Mattress sutures were used, placed through all of the coats of the artery, bringing intima to intima. After placing the last suture, before tying, a dull hypodermic needle was introduced into the artery through the remaining open space and the artery between the clamps filled with normal salt solution at 115 F., and the suture tied. The clamps were now removed and the blood allowed to pass through the point of union. Dog reoperated on October 23. The artery was somewhat constricted at the point of union and was completely thrombosed. The above technic was followed in Experiments 32 and 33, with the occurrence of complete thrombosis at the end of forty-eight hours.

EXPERIMENT 34. (October 27.)—Dog, weight twenty-five pounds. Transverse section of the left common carotid. The same technic was followed as in Experiments 31, 32 and 33, with this exception: A longitudinal incision one-sixteenth of an inch in length was made in the proximal and distal ends of the artery directly opposite; similar incisions were made on the opposite side of the artery, the aim of the longitudinal incisions being to overcome the constriction in the caliber of the artery at the point of union, from the mattress sutures. The dog was reoperated on October 28, just twenty-four hours following the primary operation. There appeared to be no constriction at the point of union. The artery was completely thrombosed. The above technic was followed in Experiments 35, 36 and 37, and operated on October 28, 29 and November 7; all were reoperated on at the end of twenty-four hours and complete thrombosis found, no blood passing the point of union.

EXPERIMENT 38. (November 9.)—Dog, weight fifty pounds. Oblique section of the left common carotid. The incision was from above downward and from the distal toward the proximal artery. Transverse section was made through the proximal end of the artery. Sus-

pension loops were placed in the distal end of the artery and the proximal end was seized with a pair of smooth tissue forceps and invaginated into the distal end. Silk sutures were placed through the adventitia into the media. When the clamps were removed no hemorrhage occurred, and the blood could be felt passing the point of union. Dog reoperated on at the end of twelve hours. A clot filled the entire artery, no blood passing the site of union.

EXPERIMENT 39. (November 12.)—Dog, weight twenty pounds. The same technic was followed as in Experiment 38. Dog reoperated on at the end of six hours. But little blood was found passing through the site of union. A clot was found almost filling the artery.

EXPERIMENT 40. (November 14.)—Dog, weight thirty pounds. The same technic was followed as in Experiments 38 and 39. Dog reoperated on at the end of two hours. A rapidly forming clot was found.

In making the above experiments a careful aseptic technic was followed. The instruments, sponges, operating sheet and gowns were sterilized in each operation. The operative field was well shaven and scrubbed with soap and water. A 1/500 per cent. solution of mercuric chlorid was then liberally applied, followed by sterile water and alcohol. The operating sheet was fastened to the operating field with sutures passed through the skin, so as to avoid contamination of instruments and sutures. Silk was the only suture material used.

## COAGULATION OF THE BLOOD.

Virchow believed coagulation of the blood was due to the arrest of the blood current in the vessel, but it has been demonstrated that this in itself is insufficient, providing the endothelial cells possess their normal qualities. Baumgarten's experiments showing that blood may be kept in a fluid state between two aseptic ligatures, and that if the artery is punctured weeks afterward, that the blood escaping from the artery will co-

agulate the same as other blood, demonstrates conclusively that more than the arrest of blood current is necessary to produce coagulation. Foreign bodies that are rendered aseptic will not in themselves produce coagulation of the blood when introduced into the interior of blood vessels. Zahn's experiments demonstrate conclusively that coagulation only follows the introduction of septic foreign bodies. It has been shown experimentally by Senn that following the placing of aseptic ligatures on arteries in continuity, thrombosis does not always occur, but that the development of a thrombus will depend upon the amount of trauma to the intima. That when the intima is severely injured or crushed a thrombus will occur. The coagulation of the blood is now known to be a chemical process. Alexander Schmidt's conclusions concerning the chemical changes necessary for the coagulation of the blood are now the accepted theory, viz.: (1) Certain soluble proteids, namely, paraglobulin and its derivative, fibrinogen, being the material from which the fibrin is derived. (2). A special ferment, fibrin ferment or thrombin, to cause the necessary changes in the proteids. (3.) A certain amount of neutral salts for precipitating and rendering insoluble the fibrin. The thrombin or fibrin ferment of Schmidt is a compound of nucleo-albumin and calcium, which, when brought in contact with fibrinogen, a reaction ensues, the calcium uniting with fibrinogen molecules, forming the insoluble compound, fibrin. The nucleo-albumin is derived from the broken-down leucocytes and blood plates in solution, the nucleo-albumin uniting with the calcium salts to form the fibrin-ferment. It will be thus seen from a recognition of the probably correct theory of the coagulation of the blood and considering the experiments that have been made and the results obtained, that, eliminating the process of infection, there still remain factors in the production of thrombosis, in the suture of arteries, yet to be met and overcome before it can be hoped to re-establish perma-

nently the circulation of the blood following end-to-end union in arteries. The possibilities of permanently re-establishing the circulation of the blood in arteries following end-to-end union, or resection, is in my opinion yet to be demonstrated.

In Murphy's experiments, as well as the writer's, it will be observed that where thrombosis did not occur, in the majority of cases an obliterating endarteritis occurred. Murphy observes: "After suture of a vessel there is a tendency to endarteritis obliterans. As this process is one of slow formation, it is one of minor importance as to the ultimate result of arterial suture. While the endarteritis is occluding the vessel, collateral circulation is being established and the danger of death of the part obviated."

## CONCLUSIONS.

The death of the endothelial cells following injury to arteries and the additional cell death incident to the trauma inflicted from operative measures for the repair of the injury probably furnishes the nucleo-albumin necessary for the production of the chemical process of coagulation of the blood.

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## DISCUSSION.

DR. A. E. HERTZLER, Kansas City, Mo.—I have had a good deal of experience along this line, and I have come to the conclusion that coagulation of blood in the vessels and the adhesions in the peritoneum occur only when the fluid underneath the endothelial cells is allowed, in the first place, to enter the lumen of the vessels, or, in the second place, to enter the surface of the endothelial cells in the peritoneum. This fluid, when the endothelial cells are broken, may travel a considerable distance, and if we expect to prevent coagulation of blood, we must have the puncture made at least one-

fourth of an inch beyond the contact point. I have had a great deal of experience in dealing with the peritoneum, and I will explain, when I come to read my paper, how this fluid influences it, and how unless this is kept in mind, the prevention of coagulation will be impossible, likewise the prevention of adhesions in the peritoneum.

Dr. James E. Moore, Minneapolis, Minn.—I think the Association is to be congratulated on having had such an exhaustive and so important a paper presented to it. Only those who have done experimental work can fully appreciate the tax upon a man's time, his energy and patience, to say nothing of the expense connected with such work. Dr. Campbell is very modest. In talking to me he said that he disliked very much to bring this subject before the Association, because the results were uniformly unfavorable. His hope was to demonstrate that we might in the future close severed arteries and preserve their function, but his experiments have shown that we can not do that. I do not see that we can find any fault with his technic. It is better than we could do in a hurry in an accidental injury to an artery. His technic seems good enough to bring about the desired result, if it is obtainable by any human agency. He has demonstrated to us the fact that we can not sew up a severed artery and have it perform its function later. Eventually, in all of these cases, thrombosis occurs.

I was talking with Dr. Senn shortly after Dr. Murphy's article appeared. Dr. S. told me that he had performed an exhaustive series of experiments along the same line, but thrombosis always occurred. He was so displeased that he did not publish the results of his experiments in detail.

While the essayist has given us no experiments with reference to the veins, the natural conclusion is that the same results will obtain as regards them. As there is a difference in structure of these two vessels, I thought there was a possibility there might be a difference in results. All of us doubtless have put side ligatures on the jugular veins, having had no hemorrhage afterwards, and we have concluded that we have saved or restored the function of those veins. Is it not possible, if the vein acts the same after operation, we have been mistaken, and in the future might it not be better to

ligate both sides of the puncture than run the risk of a side ligature to sew up the vein? Is it not natural to conclude, under all circumtsances, in which we think we have saved the deep jugular vein, we have failed?

It has been my misfortune in two instances to have an opening in the vena cava in the human subject. In the first case the belly was full of blood in a minute, but I controlled the hemorrhage by hemostatic forceps. This was 10 o'clock in the morning. My patient revived, but died at 2 o'clock in the afternoon of that day. In the other case an operation was made with the fear that I might injure the vein; I had to deal with a congenital cyst of the kidney, and in trying to separate it from the vena cava I injured the latter. My assistant put a temporary ligature above and below the attachment of the vena cava to the tumor, yet in spite of careful efforts I made a hole in the side of that vein. I closed it with a purse-string suture; the patient did not bleed, but died forty-eight hours later from thrombosis, evidently.

Dr. John E. Summers, Jr., Omaha, Neb.—A few weeks ago I visited St. Joseph for the purpose of seeing some of Dr. Campbell's work. He was absent from the city at the time, but his assistant showed me what they were doing in that line, and I was surprised to see the dexterity with which these operations were performed. Dr. Patterson, his assistant, besides doing some intestinal work, etc., made a resection of the common carotid artery and then did an anastomosis of the divided ends. One would think to see such a case at the time that there could be no question but that the circulation would continue. There was no leakage. The current of blood, when the forceps was removed from the two sides, was perfect. Pulsation was normal, and still the Doctor told me that had been so with all of their experiments. Although the experimental work promised to be a great success, still in every instance thrombosis occurred. I take it, that in the several cases of anastomosis of the blood vessels which have been reported (Murphy's case and one by our own President), sufficient time has been allowed by the technic for the collateral circulation to be established, sufficient to admit of a continuation of life to the parts below.

Dr. Moore spoke of injuring the vena cava. Several articles have recently been written where the inferior vena cava had been ligated successfully. Experiments

on animals show that the animal dies when an attempt is made to tie the inferior vena cava; but in cases where patients recovered all had been those in which continued pressure had been made against the inferior vena cava by a new growth. For instance, in tumor of the kidney, Nature had provided for the inevitable, and the circulation was taken care of just the same as in these cases of anastomosis of arteries.

Without being personal at all, Dr. Ferguson reported a case some time ago of an operation upon the popliteal, and I had in mind, when I read a report of this case, that the anastomosis must have been made below the point where the anastomotica magna and its branches circulate so freely around the knee joint and that the circulation was probably kept up for some time, sufficiently long at least that good collateral circulation was established.

I have tied the external iliac artery three times; twice for elephantiasis, and in one of these cases I tied the sciatic; the other time it was for aneurism. All of these three cases progressed favorably. If we remember our anatomy and how kind Nature is to us, with the ordinary help which we should add to our surgical procedures, such as position, etc., we can accomplish a great deal. Although it is desirable to do something along the line Dr. Campbell has suggested, it seems to me we have not reached the point when we can say that anastomosis of arteries is practical except as a mechanical procedure.

I congratulate Dr. Campbell on the work he has done. I do not know of anyone who has done so much. The work is beautiful, and any of you who may have an opportunity I advise to visit his laboratory.

DR. ALEXANDER HUGH FERGUSON, Chicago—I simply rise to compliment and congratulate Dr. Campbell on his excellent contribution, and to say that it is the only paper dealing with experimental work that we have had presented to the Association at this meeting. His experimental work points out what we ought not to do, if nothing else. There are not many places in the body where it would be recommended to tie arteries instead of doing anastomosis. For instance, in the neck you would not think of doing end-to-end anastomosis of the carotid artery. You would get thrombosis higher up. It would be better to ligate them. The popliteal artery is a practical one, and in my own case there was gan-

grene of the foot. No thrombus formed for about forty-eight hours, if I remember rightly, and then we had death of the foot. Three months after that I cut down to remove the cicatricial tissue from the popliteal space, and I found there was pulsation below the seat of anastomosis. That does not prove that there was no thrombosis there, and the possibility of reabsorption of a serofibrinous thrombus or an aseptic thrombus was rather the probable explanation. If the ligation is made in the case of septic thrombosis, of course there would be complete obliteration for all time. I believe there is such a thing as the reabsorption of this aseptic serofibrinous thrombosis, and it is a thrombosis that Macewen depended upon for the cure of aneurism, passing needles in, scratching the intima to get a serofibrinous thrombus of a septic character. If it was only done for a short time, reabsorption would take place, and it would pass away, but it had to be persisted in. I would like to make a suggestion. Take a large artery and prevent the blood from going through it for twenty-four or forty-eight hours, maybe three days, then allow the blood to course through it, with the idea that you get epithelialization over the traumatic intima, and see if any thrombosis follows.

Dr. Campbell has given us a more accurate and better aseptic technic for this work than has ever yet been produced by the profession in any place.

DR. CAMPBELL (closing discussion)—I wish to thank the members for the kind reception given my paper. I fully realize that experimental work, barren of successful results, might fail to interest you. When I began my experimental work upon the arteries, I was imbued with the belief that I might be able to originate a method that might overcome the chief difficulty met with by other experimenters, viz., the formation of a thrombus. The rather favorable reports of work done upon the human by Halstead, Murphy and Ferguson, rather stimulated me to make the effort. My work has demonstrated to my own satisfaction that the reuniting of the severed ends of the arteries can not even re-establish the circulation for a sufficient length of time for the establishment of a collateral circulation, for, as I have demonstrated in many instances, the thrombus had formed at the end of two hours after the complete operation.

# CHRONIC ADHESIVE SCLEROSING PERITONITIS, OR PLASTIC PERITONEAL SCLEROSIS.

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The "chronic adhesive sclerosing peritonitis" of the Germans is a rare disease, and, so far as I can determine, has escaped recognition and description in most of our American text-books. One or two articles in the current medical journals of the last ten years describe conditions resembling true chronic adhesive sclerosing peritonitis, but the disease is nowhere accurately described as a distinct pathologic entity. This is all the more remarkable as it appears to be well known in Germany, Virchow having alluded to it as long age as 1853, and Riedel having recently considered the subject comprehensively. In the new edition of the "Handbuch der Practischen Chirurgie," by von Bergmann, von Bruns and von Mikulicz (Vol. iii, page 85), a detailed description of the disease is to be found, and the pathologic picture is so similar to the findings at the operation and autopsy in the case here reported, that ours was readily recognized as one of chronic adhesive sclerosing peritonitis, though none of those who saw the case had ever seen any other, and none of the surgeons of large experience who were told of it had any recollection of having encountered one like it.

According to the description of the Handbuch mentioned, it may occur at one or many points in the peritoneal cavity, but the areas about the female genital

organs, the gall bladder, the flexures of the colon, the posterior part of the peritoneum, the root of the mesentery, the mesentery of the sigmoid flexure and the omentum are the points of selection. As a consequence of the chronic inflammation, thickening of the peritoneum results, which leads to shrinking.

It is alluded to in such words as *narbenbildung, schrumpfung, adhasionbildung* and adhesive sclerosing peritonitis, the latter name being descriptive of the pathologic picture presented by the disease. It is further stated that chronic adhesive and sclerosing peritonitis may be a sequel of acute infections of the intestines. All parts of the abdomen where circumscribed acute peritonitis often takes place are liable to adhesive processes. Trauma of the abdomen often gives rise to it, as well as operative procedures. The complaint may, however, start in a chronic form and reach a high state of development without an acute stage having preceded and without the patient being able to give a definite cause for its onset. The functions of the large intestine are very much interfered with through adhesions in the cecum, and flexures and mesentery of the sigmoid. Chronic constipation is, therefore, a frequent result of such conditions.

The English terminology of the forms of chronic peritonitis is so involved and uncertain, and the descriptions of the various phases of the disease so vague and varied that the impression is unavoidably forced upon one that proper differentiation and classification of such diseases as may produce this effect has not yet been made.

Under the term "proliferative peritonitis" may be found (on p. 603) in Osler's text-book, a brief description of the condition here considered, while the exceptionally exhaustive and able papers of A. G. Nicholls[1]

1. Studies from the Royal Victoria Hospital, Montreal, 1902, and The Journal A. M. A., March 14, 1903.

treat of "Chronic Hyperplastic Peritonitis;" and Douglas' "Surgical Diseases of the Abdomen" describes a form of "fibroid tubercular peritonitis" which resembles true chronic adhesive sclerosing peritonitis; and A. J. O. Kelly, in a paper on "Multiple Serositis," makes allusion to like conditions.

The essential characteristic of chronic adhesive sclerosing peritonitis, as described in the Handbuch and observed in our case, is extensive subperitoneal fibroid infiltration and sclerosing, without ascites and without "sero-fibrous or fibrino-purulent exudation" upon the peritoneum.

This would seem to demand for the disease a different classification from those pathologic processes which produce the well-known icing liver of Curschmann; and though it may be of tubercular origin, that hypothesis is far from being proved, and it is manifestly improper to confuse it with specific tubercular fibrosis as described by Douglas.

Indeed, chronic adhesive sclerosing peritonitis would appear to be primarily not a peritonitis at all, but a distinct affection of the subperitoneal and visceral fibrous or connective tissue; the feature of adhesive peritonitis supervening as a result of traumatism, operation, or transmigration of intestinal bacteria through impairment of the natural resistance of the tissues.

In view of this fact, might it not be better for us to agree upon a name for the disease which would more closely indicate its characteristics, as is done by the Germans, or perhaps even simplify the title they have given it by calling it plastic peritoneal sclerosis?

This name, through the broad significance of the word sclerosis, suggests chronicity, slight inflammatory action, contraction, and the histologic elements actually involved; while the word plastic indicates the secondary effect of the malady.

The case here reported was seen with me previous to

the first operation by Dr. Leonard Freeman of Denver. He assisted me at the first two operations, and was principal at the third, in which I acted as his assistant. To Dr. Freeman is due the credit of suggesting the possible character of the malady, he having read the article above quoted, just prior to the last operation, his surmise being amply verified by this operation and the subsequent autopsy. Drs. J. N. Hall and J. E. Kinney were also valued consultants throughout the later stages of the disease, and Dr. J. A. Wilder examined the tissues and reported the pathologic findings. To all of them I desire to make acknowledgment and offer thanks.

The patient came to Colorado about twelve years ago because of chronic and intractable malaria. She had been married twenty years and borne two children, the last ten years ago. She was 45 years of age, and had never been robust.

About seven years before her death she had a free hemoptysis, and for many years she was subject to attacks of vomiting, pain and flatulency, accompanied and followed by frothy, yeasty and very offensive stools. Her nutrition and digestion were never very good, and during the last two years of her life were bad.

In June, 1902 (sixteen months before her death), her malnutrition and distress became so profound as to demand interference; and as she presented at this time the classic symptoms of a chronic appendicitis and had a very movable right kidney, it was determined to operate for these and to make an exploration of all the abdominal organs. This operation was performed June 17, 1902, at St. Luke's Hospital, with the assistance of Dr. Freeman. The vermiform appendix was removed, the right kidney fixed to the parietes and an exploration of the pelvic and abdominal organs made.

In making the closure of the abdominal wound, however, a difficulty was encountered, the significance of which was not appreciated at the time; but in the light

of subsequent events it assumed a place of great importance, and had we known chronic adhesive sclerosing peritonitis then as now, it would have led to an immediate, positive diagnosis; for certainly it must be regarded as an unmistakable pathognomonic sign of the disease, and in our case is sufficient evidence of its chronic insidious type as, excepting those treated, no other pathologic conditions were found at this time, sixteen months before death.

This phenomenon was a total inability to approximate the peritoneal surfaces below the muscles, the peritoneum having contracted or "shrunken" away from the edges of the cut muscles so that it could not be brought together and united. It did not then give us the impression of being thickened, though could we have observed it with our present knowledge of the disease we probably would have found it so.

While we were struck by this phenomenon as very unusual, the redundancy and looseness of the normal peritoneum and its easy approximation for suturing being universal, its true significance escaped us.

Whenever present it must be regarded as pathognomonic of this disease, and every effort must be made to cover the wound, as otherwise conditions favorable for the development of the most serious phases of the disease are left, the viscera adhering to the abraded surfaces and giving rise to serious complications, as the sequel in our case demonstrated.

If the peritoneal surfaces can not be approximated, a covering of omentum should be made if, indeed, the disease has left any omentum available.

The immediate result of this operation was to improve the general health and comfort of the patient.

The old diarrhea was arrested and gave place ultimately to constipation. After about a year had elapsed, however, anorexia, nausea, vomiting, constipation, flatulency and ultimately great rectal pain and tenesmus,

with reflected pains into the back and legs, developed. Examination revealed a mass underlying the upper end of the scar of the old incision, which seemed to involve the pyloric end of the stomach and be attached to the pancreas. A tight and rigidly undilatable stricture of the rectum was found, one-third inch in diameter, three inches from the anus, and the pouch of Douglas was filled with a tumor three inches in diameter, which seemed to be incorporated with the rectal obstruction. Though the patient was not cachectic, the presumption that the disease was cancer seemed so great that this diagnosis was uppermost in our minds, though the hope was held out to the patient and family that it might not prove to be so. An immediate operation for the relief of the rectal obstruction was urged, and on Sept. 30, 1903, was done at the Woman's Hospital in Denver.

The usual incision for an inguinal colostomy was made, and through this the pelvic and pyloric masses were examined. The pelvic tumor proved to be a solid tumor of the right ovary, three inches in diameter, and was easily tied off and removed, as it was pedunculated, though firmly impacted and wedged in the pelvis. The rectal band was entirely distinct from it. The rectum, sigmoid and whole colon were densely packed with hard feces, and the pylorus and intestine were matted together in a huge mass which was densely adherent to the old scar. The detachment of these adhesions was impossible.

The sigmoid was drawn through a valve-like opening, and the usual colotomy made on the fourth day. The feces were washed out from day to day, and so the rectal tenesmus was relieved and the comfort of the patient promoted.

Again the difficulty of the first operation was encountered in closing the wound, and we were absolutely unable to bring the shrunken peritoneum together, as it had retracted beneath the flaps and would not yield

a particle. The contraction was much more pronounced than before, and again its true meaning was not understood.

No infection followed, and in three weeks the patient was up in a chair and doing well, when, after some unusual article of diet, great pain and tenderness, with gaseous distention, developed. No relief could be procured through the fistula, and it became evident that a complete intestinal obstruction had formed above the fistula, and as the whole colon could be distended with water and then emptied, it was evident that the small bowel was involved.

Hopeless as the case now appeared to be, the determination was reached to again operate for the relief of the obstruction, as it was deemed possible that something might be done, and otherwise death was inevitable.

Dr. Freeman undertook this last operation, I assisting. The probable nature of the case was now suspected, as the German account of the disease had come to our attention.

A long incision was necessary, and the whole length of the distended small bowel was examined to determine at last that the point of absolute obstruction was near the lower end of the ileum, and that it was solidly attached to the underside of the inguinal colostomy incision at the point where the peritoneum could not be made to cover it.

This attachment was so firm that the bowel was torn completely across in an effort to separate it, and it was necessary to resect about six inches of small intestine and make an anastomosis with a Murphy button. In order to get round the mass of adhesions about the pylorus, which involved the stomach, gall bladder, duodenum and pancreas, a gastro-enterostomy was done, though with great difficulty, as the stomach was contracted to about the diameter of the large intestine and was enormously thickened, so that the shank of the Murphy but-

ton was scarcely long enough to reach through and lock, and the purse-string suture in the stomach wall could not be made to pucker the tissue about it. Much difficulty was again encountered in closing the wound in the peritoneum.

Fourteen hours after this operation the patient died, and consent for a partial autopsy being procured, the following striking pathologic conditions were found.

There was a general shrinking, thickening and contraction of the peritoneum everywhere, but it was most marked in the regions indicated as the favorite sites of the disease, i. e., about the pylorus and gall bladder, the flexures of the colon, the rectum and pelvic organs, the mesentery and the peritoneum covering the posterior wall. There was no ascites and no sero-fibrous or fibrino-purulent exudation upon the peritoneum.

The stomach wall was in places more than half an inch thick and the gall bladder, duodenum, pylorus and pancreas were so matted together as to be quite inextricable. The pancreas was small and so infiltrated with connective tissue growth as to be almost cartilaginous in consistency. At three points the small bowel was so tied down by contraction of its mesentery as to have its lumen greatly interfered with and the caliber of the rectum at the point of constriction was reduced to a diameter of less than a quarter of an inch, with its walls quite three-fourths of an inch in thickness. A loop of the extreme lower end of the ileum was firmly attached to the bladder. There was also a firm stricture at the pyloric end of the stomach of only about one-third inch in diameter. The mesentery of the small bowel was rather thickly studded with small miliary nodules, which were apparently not tubercular.

Most curious of all was the condition of the kidneys. The right, which had been fixed at the first operation, being so firmly attached as to make its removal almost impossible, and both the right and left kidneys presenting a condition of cystic degeneration, or hydrone-

phrosis, due to pressure upon the ureters by the shrinking fibrous posterior peritoneum.

The liver and spleen were normal, though the superior surface of the liver was adherent to the diaphragm. At the site of each of the former incisions through the peritoneum the viscera were firmly adherent to the cicatrix. The cut surfaces of the thickened stomach and rectal wall were white and glistening, and they were clearly the seat of an enormous hyperplasia and connective tissue growth. This was also true of the pancreas and the mesentery of the bowel, which was very much thickened and shortened throughout. None but the abdominal organs were examined.

Incidentally it may be mentioned that, for about fifteen years, this lady had a peculiarly dry, wrinkled and shrunken skin, with almost a complete arrest of secretion from its glands, coincident with the development of the first abdominal symptoms, which may have been a part of the same general pathologic process.

*Microscopic Examination.*—Dr. Wilder's report is as follows:

The ovarian growth measured 3¼x2½x1½ inches. Surface smooth, lobulated, and surrounded by connective tissue capsule that is firmly adherent to the underlying tissue. The tissue cuts with considerable resistance, has a pinkish, flesh-colored appearance and is firm throughout, no areas of necrosis or caseation being found.

Sections made from different parts, including both periphery and center, had the same general appearance. They consist entirely of connective tissue fibers and cells, in some places the former predominating, in other places the latter. The most notable feature of the cellular material is that it is in all stages of fatty metamorphosis. Blood vessels are present in moderate number, and apparently have normal walls. I am unable to find anything suggestive of ovarian tissue in the specimen examined.

Sections from the stricture of the rectum show nothing

but a dense mass of adult fibrous tissue. Very little cellular material is seen. The vascular supply is poor, but where present the vessels have well-formed walls. No evidence of degeneration can be found.

Sections from the cardiac end of the stomach show an advanced stage of interstitial gastritis, and an enormous increase of connective tissue is seen, which has deeply penetrated the muscular coat. A marked increase of interstitial tissue is seen between the tubules, which have themselves undergone extensive atrophic changes. Sections taken near the pylorus have a similar appearance. Sections from the pancreas show a marked interstitial pancreatitis, the trabeculæ being greatly thickened and the cells apparently suffering from pressure atrophy. The omentum also shows a marked increase in fibrous tissue and the lymph nodes inclosed in it show hyperplasia of lymphoid cells, with an increased amount of connective tissue in the trabeculæ.

The points of greatest interest in connection with this case are:

1. The rareness of the disease.

2. The failure to generally recognize and fully describe it on this continent, though it has been long and well known abroad.

3. The pathognomonic sign—inability to unite a shrinking peritoneum once divided during the course of an operation—which, so far as I am aware, I am the first to observe and describe.

4. The essential chronicity of the disease, as indicated by the long-standing symptoms, otherwise unexplained, and the shrinking and retraction of the peritoneum at the first operation (sixteen months prior to her death), which proved the previous existence of the malady, and that it was not directly or indirectly the result of the operation.

5. The great importance of covering all denuded surfaces when before or during an operation chronic adhesive sclerosing peritonitis is diagnosed.

6. The characteristic sub-peritoneal connective tissue hyperplasia, which is the pathologic feature of the disease; and

7. The shrinking or contraction of the peritoneum caused by it, the clinical feature.

8. The possible significance of a somewhat similar pathologic process taking place in the skin coincident with unusual gastrointestinal symptoms otherwise unaccounted for; and

9. The possible diagnostic value of this syndrome.

10. The element of risk of serious sequelæ incident to its surgical treatment.

## DISCUSSION.

Dr. John P. Lord, Omaha, Neb.—In one of the museums of Europe (I think it was in Berlin) I saw one of these extraordinary specimens. The internist had made a diagnosis before death. The patient was kept in the hospital for months. The excessive development of connective tissue was astonishing. The thickness of connective tissue between the various intestines I should say averaged an inch in some places, possibly more. It looked like a tremendous fibroid tumor; only on examining the cut surface of the mass could one comprehend the real condition.

Dr. Leonard Freeman, Denver, Colo.—I had the fortune, or the misfortune, of seeing this case with Dr. Wetherill. He has given such an excellent description of the disease that it is impossible to add anything to it. Attention was called to the extreme difficulty in diagnosis, and to the great difficulty of doing anything for the patient, provided a correct diagnosis is made. The disease sometimes follows operative measures, without our knowing why it should do so, and operative measures serve to increase the distress of the patient in some instances. Riedel suggested in his article that it was impossible to do anything except to operate. If an operation is undertaken, however, the operator must be prepared to make resections of the bowel, and even that, Riedel says, may not give relief, because additional adhesions may form. Dr. Wetherill spoke of covering every point that is left uncovered by the peritoneum. That is all-important, provided one can cover these

points, but the tendency of the peritoneum to retract is prohibitive of doing anything thoroughly in this line. I think any one who had looked into an abdomen, such as Dr. Wetherill has described, would have been struck by the hopelessness of the condition. We might relieve one point, but there is always another point, and the adhesions extend in every direction, re-forming as soon as anything is done. The stomach in this case was a remarkable organ. As Dr. Wetherill says, it was contracted to the size of the colon. Perhaps his description did not make it clear as to the thickness and rigidity of the stomach walls. After the stomach had been taken out, it could be picked up by one end and stood out straight as though it were a sausage. The cavity was very small, which gave rise to confusion in attempting to make a diagnosis before operation. A small amount of fluid only could be gotten into the stomach, and the way it came out immediately made us think there was a spasm of the cardiac orifice and dilatation of the esophagus. Gastro-enterostomy, as Dr. Wetherill has said, was attended with the most extreme difficulties. On account of the thickness and rigidity of the stomach walls, the incision could not be stretched open. The shank of a Murphy button was forced through. One would have had to cut out a round hole in the stomach to obtain an adequate opening to do the operation by suturing alone. The adhesions were so extreme in the region of the cecum that at the autopsy the intestines could scarcely be taken apart. The case did not progress as the one described by Dr. Lord. That must have been an extreme form of the disease, and could only be reached in case the patient was lucky enough to escape intestinal obstruction by the adhesion of one fold of bowel to another or by contraction of the mesentery.

# GASTROINTESTINAL HEMORRHAGE WITH PORTAL OBSTRUCTION FOLLOWING OPERATION.

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COUNCIL BLUFFS, IOWA.

Hemorrhage from the stomach and upper intestinal tract as a symptom of gastric or duodenal ulcer and malignant disease has attracted but little surgical interest until the past few years. To-day, in the treatment of these diseases, after giving nature a thorough trial, the internist is no longer justified in discouraging surgical intervention. Early gastric carcinoma now belongs to the surgeon; even in the later stages of this disease, gastro-enterostomy often affords the only relief to the sufferer during the remaining days of life.

The study of the symptoms of hematemesis, or more properly speaking, gastrorrhagia and bleeding from the upper intestinal tract, as regards its relation to pathologic conditions other than ulcer and carcinoma of these organs, seems to have been overlooked by the surgeon, or perhaps he "hasn't got that far." Hand in hand with the advance of the knife on gastric disease come the discoveries of new territories; symptoms which, a few years ago, were obscure and uncertain, will soon be divided and subdivided into definite, well-formed and scientific guideposts, which will enable us to travel in a well-beaten path to a successful surgical goal.

With the literature at my command I am able to gain but little aid in the preparation of this article,

other than to record a mass of conflicting ideas and theories, from which the surgeon must build, sooner or later, a solid, positive and scientific foundation upon which to stand. I have selected "Gastrointestinal Hemorrhage with Portal Obstruction Following Operation" for two reasons: 1. In order to exclude as far as possible the discussion of the classical stomach and duodenal ulcer, carcinoma, and in fact any pathology within these organs not due to extrinsic causes. 2. I believe that nearly all other hemorrhages from the gastric or duodenal mucosa to be due, directly or indirectly, to some pronounced or obscure portal or hepatic pathologic or bacteriologic factor.

For the sake of convenience I will limit the area of hemorrhage to the stomach and upper intestinal tract. It must appear obvious that all gastric hemorrhages must fall in one or the other of the following classes:

1. Vicarious or some other habitual hemorrhages.

2. Injury to the stomach or disease of that organ itself.

3. Bleeding may occur in consequence of other diseases, producing a morbid condition of the blood and, therefore, happen only as one symptom of a general disease.

4. Pathologic conditions remote from the stomach, which, by mechanical obstruction, produce a plethora or varicose condition of the veins of the organs; or this same obstruction may become the cause (or is the effect) of secondary blood changes of a nature to disturb the coagulating properties of the fluid. A condition of so-called icteremia or cholemia then becomes manifest.

5. *Unknown* or idiopathic gastrorrhagia.

The latter is an old term, but must be used here for lack of a better one. With the subject under discussion we may exclude Nos. 1 and 2.

No. 3. In which the blood changes are due to leukemia, sea scurvy and kindred anemias, other well-defined symptoms appear long before hemorrhage, there-

fore this class is of little interest to the surgeon at the present time.

No. 4. In this classification the hemorrhage is due to an obstruction of the portal circulation. Two conditions are possible here, viz.; (*a*) Mechanical obstruction without jaundice. (*b*) Mechanical obstruction with jaundice.

(*a*) Mechanical obstruction without jaundice. Here we have to deal with intense passive congestion—congestion arising from the detention of blood in the veins by some mechanical obstacle to its progress. The mucosa becomes greatly congested, the spleen enlarges, stomach symptoms supervene, and altogether it seems that an explosion must soon take place. If the spleen, which I believe to be the safety valve of the portal system, can not manage its task, one or more of four results must follow. 1. The obstruction may be removed and the patient recover. 2. If not too acute, the anastamosis of the portal and systemic veins may relieve the congestion to a certain extent. In this manner varicosities and venous thrombi are developed. 3. A serous exudate may follow in chronic cases, with the resulting ascites or edema and even pleuritic effusion. 4. The smaller vessels of the mucosa may rupture or explode, as it were, in acute cases, or during the course of a chronic obstruction, provided some unusual excitant appears. Here, again, in chronic obstruction with dilatation of the mucous veins, usually found in the duodenum, stomach and lower esophagus, sudden rupture may take place when some unusual exciting stimulus is exercised to unbalance the equilibrium of the patient. In the latter, which so often occurs during the early course of cirrhotic livers, hemorrhage into the stomach may be the first symptom, the individual thinking himself a perfect physical specimen.

(*b*) Obstruction with jaundice. In this subdivision I believe I stand alone, and my views differ somewhat from the rest of the profession. It seems to be the

unanimous opinion of writers that gastric or intestinal hemorrhage occurring during jaundice is due to a blood change only. That a condition known as cholemia or icteremia supervenes, and that the blood loses its coagulating properties, but I also believe that the coagulability of the blood is affected, and that hemorrhage once started is with greater difficulty controlled, but I am far from convinced that the cholemic condition is the initial factor in the production of the hemorrhage.

I would further classify the etiological factors in the production of this portal obstruction as follows:

*Venous Obstruction to the Portal Circulation with or Without Jaundice.*—Infective: Inflammation of bile ducts, pancreatal, enlarged glands, emboli, thrombi, cirrhosis and other hepatic lesions, bacterial toxins. Non-infective: Carcinoma, tumors, renal or hepatic obstruction, cardiac obstruction, emboli, thrombi.

Pancreatitis may in the same manner produce an obstruction. In fact, pancreatitis is often associated with infection of the biliary passages. This may extend to the smaller ramifications of the biliary tracts in the liver; pressure symptoms supervene and produce the obstacle to the portal circulation necessary to excite the mucous hemorrhage upon the slightest provocation. Enlarged glands due to infective or malignant disease remote from the stomach and duodenum may be factors in the production of venous obstruction. Thrombi, emboli and cirrhosis and other hepatic lesions may easily promote obstruction, as is well known. In connection with cirrhosis of the liver, Dr. R. B. Preble[1] has studied the reports of 60 cases of fatal gastrointestinal hemorrhage caused by this disease. He concludes that it is somewhat infrequent, but not rare. It commonly complicates the atrophic variety, but may occur in the hypertrophic form. The first hemorrhage is fatal in one-third of the cases.

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1. Amer. Jour. Med. Sci., March, 1900.

Diagnosis was made in only one-third of the cases at the time of the first hemorrhage. In 80 per cent. of these cases esophageal varices were present. In over one-half of the 80 per cent. there was evident rupture of these varices and probably rupture could be found in many other cases, with proper investigation. Fatal hemorrhages occur, however, from the capillaries in the gastrointestinal mucosa. Dr. Preble states that gastric hemorrhage is commonly the first symptom of cirrhosis. Subcutaneous veins were enlarged in 6 per cent.

Collateral circulation of the veins of the portal system with those of the systemic occur in various ways. 1. Communication may be found between the veins of the mesentery and those of the posterior abdominal walls; 2, between the coronary veins of the stomach and those of Glisson's capsule and esophagus; 3, between the hemorrhoidal and inferior mesentery; 4, between enlarged veins occupying the position of the obliterated umbilical vein in the ligamentum teres and the epigastric and mammary veins (Musser).

It may be noted that the communicating vessels are very small indeed, and when called upon to do extra work must be prepared to care for immense quantities of blood, otherwise the patient must suffer the consequences. It must not be forgotten that obstructive causes may have origin in the heart, therefore, the necessity of opening the thorax in all fatal obscure gastric hemorrhages following operation. My observations are that this has not been done. I will now cite a case to illustrate above:

Dr. T. H. Green[2] reports a case, a boy 19 years of age, first seen because of repeated gastric hemorrhages. Had vomited blood two months before, when he suddenly expelled a quart of clotted blood. Following evening vomited blood. Boy had no pain, but had slight swelling of legs later on. Later, after expelling large quan-

2. Brit. Med. Jour., November, 1899.

tities of blood by mouth and rectum the patient expired. Postmortem showed heart large and mitral orifice much stenosed with recent vegetations, also vegetations on aortic and tricuspid valves. Heart also fatty. *There was thrombosis of the splenic vein throughout its course* from spleen to junction with superior mesenteric. No lesion of any kind found in the stomach or intestinal mucosa.

This case did not follow an operation, but it serves my purpose well. Had this boy, during the earlier stages of the disease, been subjected to an abdominal incision, I might now be recording another post-operative hematemesis with venous thrombosis of the inferior mesenteric or splenic vein. "Cause unknown," or perhaps "due to ether," or "chloroform" given as cause of death. Again, if sepsis had been present after the operation, the surgeon would probably have given "infection" as the causative factor.

Dr. Rodman, in his masterly oration before the American Medical Association, June, 1900, advances the theory that sepsis is responsible for the post-operative hemorrhages. I agree with him that sepsis is one of the exciting causes, but that gastric hemorrhages following operations may occur without the slightest indication of sepsis, I believe I will prove not only by one of my own cases, but several others here recorded.

Mr. Mayo Robson, in his Hunterian lecture, states that he has encountered post-operative hematemesis in seven cases of his own (Rodman), four fatal.[3]

Robson's cases occurred after operations for intestinal obstruction, tuberculous peritonitis, herniotomy, ovariotomy and gall-bladder operations.

Dr. Winslow[4] reports one case in a woman of 65 years after operation for umbilical hernia, where death came on the third day from a tremendous gastric hemorrhage.

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3. Robson: Surgical Treatment of Diseases of the Stomach, p. 133, 1901.

4. Lancet, Oct. 20, 1900.

At postmortem stomach and intestines contained large amount of blood, but no lesions of any kind could be discovered.

Mr. W. C. Mansell-Moullin[5] reports one case, age 23, who, twenty-four hours after a simple exploratory incision in left iliac fossa, died from profuse gastric hemorrhage.

Professor von Eiselsberg's[6] explanation that post-operative hemorrhage is due to traumatism to the omentum is not always true. The same theory is also advanced by Ransohoff and others in my personal communciation. This theory, in my opinion, is absolutely correct in some of the cases reported, but is simply one of the various etiological factors in the production of thrombi, etc., as a result of which portal obstruction is instituted. That this is not true in all cases the following, with one of my own to be disposed of later, may serve as an example:

M. Robson reports one of his deaths due to gastric hemorrhage following an operation for malignant tumor of the common duct with distended gall bladder. The operation was done under cocain, the bladder being simply exposed through a small incision stitched to the parietes and drained without exposing any of the viscera. Robson here advances nervous influence as the causative factor.

Again,[7] Dr. Rodman has experimented upon four dogs and attempted to produce gastric hemorrhage by rapid and severe traumatism to the parts surounding the stomach. He ligated the omentum high up and then resected. In the second he twisted the omentum and ligated and squeezed the spleen and pancreas forcibly. In the third he squeezed the intestines and liver in addition to twisting the omentum into a rope. In

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5. Lancet, Oct. 20, 1900.

6. Robson, M.: Surgical Treatment of Diseases of the Stomach, p. 133.

7. Oration on Surgery, A. M. A., 1900.

these three cases the dogs were not allowed to recover from the anesthetic, but none of the experiments produced the slightest change in the stomach mucosa. In his fourth experiment he twisted the omentum into a rope and tied, then closed the wound, the dog making a perfect recovery without the slightest indication of internal hemorrhage. Rodman wrote to fifty surgeons, only seven of whom had seen post-operative hemorrhage. Three operators, Johnston, Parrish and Wathen, have each had one case following hysterectomy. All occurred within a week. One proved fatal.

Noble and Wathen each had a fatal case following nephrorrhaphy. In Noble's case hemorrhage occurred the twelfth day. Johnston also reported to Rodman four cases—one following ovariotomy with twisted pedicle, one suppurating ovarian cyst, one after strangulated hernia, and one after extra-uterine pregnancy. The first three proved fatal, and were accompanied with general peritonitis; the fourth recovered.

Rodman also reports two other fatal cases collected (Clark and Noble) due to duodenal ulcer. Clark's was an intrapelvic, while Noble's was a ventral hernia. The latter, however, are to be excluded in my paper.

Robert Purves[8] collected eleven cases of post-operative hematemesis. He says: "The advent of hematemesis after operation is a serious complication. The mortality is high, and eight of the eleven cases reported in the paper ended fatally, a death rate of 72.5 per cent. Of the twenty-nine cases reported prior to Purves' collection, 69 per cent. died.

Rodman is inclined to believe hematemesis to follow only abdominal operations and in the two nephrorrhaphies collected he says: "In doing nephrorrhaphy the peritoneum may, in the first place, be incautiously opened by the most careful operator, and secondly, there is always a considerable amount of traumatism necessary

8. Edin. Med. Jour., March, 1903, vol. xi.

to force the kidney into the lumbar incisure, etc. To disprove this Purves[9] collected two cases in which gastric hemorrhage followed extraperitoneal operations; through the thigh in one and removal of a neuroma in an amputation stump in the other. In another case to be reported later, fatal hematemesis followed the removal of the Gasserian ganglion.

Dr. George R. Fowler[10] reports a case of fatal gastric hemorrhage following appendicectomy, the postmortem findings of which are most interesting. After reviewing similar articles by Kirmisson, Dieulafoy, Nitzsche and Zypkin, he concludes that gastric hemorrhage has added another to the already long list of grave sequelæ of appendicitis. Dr. Fowler's case was a young man, strong and robust, gangrenous appendix removed. Patient died several days later from hematemesis. No general peritonitis found on postmortem examination, only a little reddening around the cecum. Spleen soft, dark and stroma increased. Stomach size normal, mucosa thickened and opaque. Many small ulcers (from 200 to 300) about the size of small seeds could be detected, mainly in the trend of the lesser curvature. Some of these ulcers contain fresh and others altered blood upon their surface. Liver, size normal; gross section smooth and dull; acini contain fat. Microscopically, several sections show emboli, each involving a vessel in the mucosa above its bifurcation. Each embolus has distended the vessel, and is itself necrotic. Numerous other interesting sections are described by Dr. Fowler, but the time allowance of my paper will not permit of their study here.

Dr. Edward Hornibrook[11] reports a case of fatal gastric hemorrhage after operation upon a septic case of appendicitis. He believes the bleeding due to some toxin.

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9. Edin. Med. Jour., March, 1903.
10. Brooklyn Med. Jour., July, 1903.
11. Iowa Med. Jour., November, 1903.

Arthur H. Buck[12] reports a case of post-operative gastric hemorrhage in an abdominal section for fibroid uterus. Very large amount of blood expelled. Buck attributes the hemorrhage to reflex nervous influences. His case recovered.

Dr. Kenelen Winslow[13] reports a death from post-operative gastric hemorrhage in a clean laparotomy. Postmortem failed to show any pathologic condition present in the stomach or intestines.

And finally a new exciting cause has been found by P. Kraske,[14] namely, the Trendelenburg position. He believes the abdominal contents press upon the liver and stomach and indirectly congest these organs, thereby exciting hematemesis. This is more apt to occur in fat subjects. He relates a fatal case. The following two cases occurred in my own practice:

Case 1.—Mr. J. Van. K., aged 41, stockman and farmer, Silver City, Iowa, referred by Dr. Agan. Strong, muscular man. Never sick in his life except for several attacks of appendicitis. These were never severe, however, until his final illness. I was called to Silver City by Dr. Agan, and opened an immense appendicular abscess eight or nine days old. The pus was well walled off and did not communicate with the abdominal viscera. The cavity was simply opened and a large tube inserted. Patient progressed in perfect order until the fourth day, when, after a tremendous gastric hemorrhage, he soon expired. No postmortem allowed.

Case 2.—C. T. S., Council Bluffs, capitalist, age 43, weight 210 pounds, height six feet. Strong and well-proportioned man, except for a chronic gouty or rheumatic affection in the fingers and toes. For this reason, of late Mr. S. has led rather a sedentary life. Moderate drinker and good liver. August, 1903, he suffered a severe attack of appendicitis. The author was called

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12. London Lancet, August, 1903.
13. Northwest Med., March, 1903.
14. Archiv f. klin. Chir., Berlin, November, 1903.

forty-eight hours after initial symptoms, but advised against operation at that time. Dr. A. F. Jonas of Omaha was called in consultation. This gentleman also advised against immediate surgical intervention, and agreed with my ideas as to treatment. Under the starvation plan, described best by Dr. Oschner, Mr. S. made a good recovery after a rather stormy siege lasting eight days. One month after complete recovery, during which time the patient was under constant observation and subjected to a thorough course of baths, massage, dietetic and other preparatory treatments, Mr. S. was admitted to the W. C. A. Hospital. His appendix after removal measured five inches in length and one inch in diameter. The ceum showed evidence of recent inflammatory changes, making it necessary to turn in the lower part of this organ in order to gain normal peritoneum and allow the sutures to hold properly. The vessels in the abdomen walls showed an unusual desire to cause trouble, and the veins were markedly enlarged. Otherwise nothing unusual occurred, and the patient made an apparently good recovery, except for the uncontrollable vomiting and nausea, which persisted until the fifth day. Temperature never passed the normal mark, while the pulse persisted at the low, strong beat of 65 to 68. Sutures removed the tenth day, with not a sign of infection. The thirteenth day after operation, during which time he was on a diet usually described by the internist as the treatment for gastric hemorrhage, and while smoking a cigar and contemplating his home-going the next day, he was suddenly seized with nausea and burning in the stomach, and complained bitterly of a feeling of fullness in region of liver. A tremendous hemorrhage followed within a few minutes, and the gentleman became as one dead. Pulse had disappeared at the wrists. Heart, upon auscultation, imparted an occasional flutter to the ear, while the respirations were far apart and of that character usually seen a few minutes before dissolution. My

father was in the next room of the hospital, otherwise I am sure death would have taken place in a very short time. He immediately instituted intravenous normal salt solution and stimulated with strychnin and nitroglycerin. I arrived thirty minutes later, and found the patient still pulseless, but general facial signs of life. Within an hour the gentleman began to show evidences of consciousness, pulse became better and the crisis was passed.

A very peculiar phenomenon present struck me as most interesting, and for which I can not account in any way. This was the manner of return of the heart beat and pulse. Instead of 160 or 180, as it was immediately before, it became uncountable and absent, it came back at 60, and never after that reached higher than 68. Twenty-four hours later, except for his general weakness and extreme anemia, the patient was in good shape. Fearing a recurrence of the hemorrhage, Mr. S. was kept in hospital two weeks longer under a most careful diet, rectal feedings, gelatin, adrenalin, etc. The patient is now in apparent perfect health and attending to his business. I neglected to state that large clots of old blood were expelled per rectum for several days after the hematemesis. The nurse in charge insists that ten pounds of clots passed from the patient during the hemorrhage, and I have no doubt of the truth of this statement.

What was the cause or were the causes of the hemorrhages in my two cases? One septic (so called), the other non-septic. In order to answer this question I have written to forty well-known busy surgeons and gynecologists throughout this country beyond the territory occupied by this association. Of these twenty-three responded. After receiving their theories, I am even more at sea and confused, and yet satisfied on one point, namely, that post-operative gastrointestinal hemorrhages are not at all understood by the profession; in fact, many of our leading authorities appear

ignorant of the existence of such a catastrophe. Believing this to be a new territory, not alone as regards sequelæ of appendicitis, as Fowler remarks, but as a possible complication of any operation, especially within the peritoneal cavity, I will take the time of this society to cite from each letter received.

### ANSWERS RECEIVED BY LETTER.

No. 1. Dr. Robt. Dawbarn, New York—Has had none in his own practice. Two cases were reported to him by surgeons who used his (Dawbarn's) stump technic in appendicectomy. In his letter he very kindly explains his method, which is familiar to every member of this society. He attributes (overlooking the fact that post-operative gastrointestinal hemorrhages may occur after any operation) the hemorrhages in both cases to the stump of the appendix. He lays great stress upon the importance of first "chewing" the stump before invaginating it into the cecum. In this way Dr. Dawbarn says the hemorrhage will be prevented.

No. 2. Dr. A. Palmer Dudley, New York—"Never saw a case."

No. 3. Dr. Joseph Bryant, New York—"Never saw one."

No. 4. Dr. William B. Coley, New York—"Never saw a case."

No. 5. Dr. J. H. Carstens, Detroit—"Must be very rare; have never seen one."

No. 6. Dr. J. M. T. Finney, Baltimore—One case, which followed the removal of the Gasserian ganglion. Patient was an old lady, otherwise in good condition, except for a uterine fibroid of considerable size, which had never given her any trouble. Dr. Finney used the Hartley-Krause method, and except for tremendous hemorrhage got along all right. She was apparently getting along well, when twenty-four hours after operation, following a gush of blood from the mouth, expired. Dr. Finney obtained no autopsy, and refrains from advancing a theory as to the cause of the hematemesis.

No. 7. Dr. John M. Baldy, Philadelphia—"Never saw a case."

No. 8. Dr. B. Farquhar Curtis, New York—"In a large series of laparotomies of all kinds I never saw a case of this rare complication."

No. 9. Dr. J. Baldwin, Columbus—One case. Obstructive jaundice from gallstones and infected gall bladder. Patient died suddenly, forty hours after vomiting large quantities of blood. Autopsy showed multiple abscesses in spleen, pancreas and other portions of the body. Stomach and intestines gave no evidence of ulceration. Theory as to cause, cholemia and pyemia.

No. 10. Dr. J. William White, Philadelphia—Two cases, three and four days after operation. Both obstructive gall-bladder disease. One from gallstones, the other from carcinoma with jaundice of several months' duration. Blood changes due to toxemia given as cause of the hemorrhage.

No. 11. Dr. John B. Deaver, Philadelphia—"I have had no experience with gastrointestinal hemorrhage following operation."

No. 12. Dr. Robt. T. Morris, New York—"Several." This surgeon does not give condition calling for operation. One case showed ulcer of pyloris on postmortem examination, and one gallstone case showed icteremia with multiple hemorrhagic points in bowel mucosa. Ether used. Dr. Morris' theory is rather unique and is as follows: "Ether is excreted by the stomach mucosa, and is very apt to excite an exacerbation of local irritation unless the operation is quickly performed and unless the stomach is filled with water in advance of operation, or some other anesthetic beside ether is used."

No. 13. Dr. Hunter Robb, Cleveland—One case which was reported in the Johns Hopkins Bulletin, March, 1892, under the heading "A Case of Streptococcus Infection of the Vermiform Appendix and Fallopian Tube." In this case there was no evidence of hemor-

rhage until discovered by autopsy. In the paper Dr. Robb advanced the theory of the possibility of the cauterization of the pedicle being concerned in the production of the ulcer. Dr. Robb in his letter also mentions a severe bleeding from the rectum following laparotomy for adherent lateral structures. This patient finally recovered.

No. 14. Dr. J. Sheldon Horsley, Richmond—One case, due to obstructed bile ducts caused by enlarged head of pancreas. Cholecystenterostomy with Murphy button.

No. 15. Dr. Joseph Ransohoff, Cincinnati—Had several cases, number not given. All of his cases followed obstructive gall-bladder disease. Hemorrhages, he says, come from a thrombosis of some of the veins of the stomach or duodenum, producing necrosis of the gastric mucosa.

No. 16. Dr. George Woolsey, New York—"Never saw a case," but he reports one in his letter which occurred in the practice of Dr. T. M. Muller of Binghamton, N. Y. "A severe gastric hemorrhage during convalescence from appendicectomy."

No. 17. Dr. Joseph M. Mathews, Louisville—"Never saw a case."

No. 18. Dr. Maurice H. Richardson, Boston—"Never had a case."

No. 19. Dr. Chas. B. Nancrede, Ann Arbor—"Have never seen a marked gastric or intestinal hemorrhage following operation."

No. 20. Dr. Henry O. Marcy, Boston—Fortunately I do not recall a single case in my work. Quite 3,000 laparotomies besides a full quota of general surgery."

No. 21. Dr. Robert Abbe, New York—"In a very large number of operations have never had a complication of this character."

No. 22. Dr. Reuben Peterson, Ann Arbor—"Never saw a case."

No. 23. Dr. John G. Clark, Philadelphia—"Never

had a case." He says: "In view of the fact that this complication is so rare, I believe it is only a coincidence, and not in any way attributable to the operation."

From the above report one is immediately impressed with the chaotic condition of his mind after a careful study of each letter. Beginning with Dr. Dawbarn, with his appendicular stump idea, which certainly could not apply to a strangulated hernia or abdominal hysterectomy, and ending with Dr. Clark, who believes such complications are but coincidences, having nothing to do with the operation in any way. I can not agree with either of these illustrious gentlemen. I can not conceive of a marked hemorrhage taking place from the stump of an appendix, no matter how it may have been treated. It seems to me an anatomical and pathological impossibility. However, if my theory be correct, I can readily understand how a septic stump might be the source of a small embolus, which, breaking away, may ultimately become lodged in the venous system higher up and be the cause of a portal congestion or obstruction with secondary thrombosis, ulceration, etc., in the gastric mucosa taking place later.

With portal obstruction present, very little more pathology may bring about a hemorrhage. Following obstruction, stagnation, secondary thrombosis, necrosis, ulcer, hemorrhage, perforation may each in turn appear. I am firmly of the opinion, although I have never heard or read of this statement before, that many of the so-called ulcers of the stomach and duodenum are nothing more than the gastric ends of small thrombotic veins; in other words, that anemics predispose to general stagnation, if I may be pardoned for using this common term, in the general vascular system, but is much more pronounced in the portal venous system by virtue of the fact that the normal *vis a tergo* is much lower here than in the general systemic system. Small thrombi having formed in the most natural place, necrosis often ensues,

followed by ulcer of the stomach, the latter pathology giving the only symptom upon which to make a clinical diagnosis. A vicious circle now is evident, the ulcer intensifying the general mal nutrition, while the latter predisposes to further venous stagnation or portal obstruction. Clinically we often see these stomach symptoms disappear in young women after a thorough course of dietetic and hygienic treatment. Gastroenterostomy frequently breaks the circle, heals the ulcer, and if the portal obstruction is not marked, the patient recovers. That Dr. Clark is mistaken is evident by the cases of gastrointestinal hemorrhages recorded.

That Dr. Rodman's theory of sepsis being the cause of post-operative gastric hemorrhages is not always true, is also evident by the cases cited. It is the writer's opinion, however, that sepsis, especially peritonitis, is frequently the exciting factor in the production of emboli and thrombi in the vessels of the portal, as well as in the general venous and even arterial system. In this way only can sepsis be held responsible for post-operative hemorrhages of the gastric mucosa. The ether theory of Dr. Robert Morris can not be accepted by the writer, as in the cases above recorded, chloroform was used in many of the fatal cases, while cocain was used in one case by Mr. Robson.

In Dr. Finney's Gasserian case, I am of the opinion that the very large fibroid tumor of the uterus "which had caused her no trouble," was the very obstacle to the portal circulation, which, by simple, mechanical pressure, probably produced varicosities in the esophageal mucosa, which had existed for some time. The shock of the operation upon the circulation, especially the stagnation in the portal veins, became the "last straw" necessary to produce the rupture. Here, again, the great abdominal sympathetic brain may have held an important place in the production of the hemorrhage.

## SUMMARY.

1. Post-operative gastrointestinal hemorrhage must

be accepted by the profession as a possible horrible complication of any operation.

2. It is to be feared more after operations upon viscera directly connected with the great portal system of veins.

3. The cause of the hemorrhage may be produced by many exciting factors, i. e., sepsis, injuries to the abdominal viscera, Trendelenburg position, cirrhosis of the liver, abdominal tumors, gallstones, nephrites, obstructive heart lesions, weights upon the abdomen during operation, chloroform, ether, reflex shock to the great abdominal sympathetic nervous system, etc.

4. The above exciting factors alone are not capable of producing a direct hemorrhage into the stomach or duodenum without the actual existence of one of two conditions, namely: (*a*) Of pre-existing pathology somewhere in the portal system. (The liver as well as the gastric, lower esophageal and duodenal mucous veins are considered as part of the portal system.) (*b*) Of portal obstruction, the result of these exciting factors mentioned above. Peritonitis in any form as the exciting factor with resulting thrombosis as the true cause of the hemorrhage, may be cited as a fair example.

5. In one-third (Preble) of the gastric hemorrhages due to cirrhotic livers, the bleeding is the first symptom of the disease.

6. That a surgical operation or an unusual happening, such as a severe debauch, may be the last straw necessary to produce a fatal gastric hemorrhage in patients with cirrhotic livers.

7. That cirrhosis of the liver, even in the early stages, is frequently accompanied by varicose veins in lower esophagus and stomach; these, in turn, may rupture, and often result in fatal hemorrhages or terminate in an ulcer; therefore, ulcer of the stomach is often due to cirrhosis of the liver; in other words, portal obstruction may be the cause of the gastric ulcer.

8. If gastric ulcer be found upon postmortem following gastric hemorrhage, it may not in itself be the of-

fending enemy, but may have been an unwilling accomplice pushed on by portal obstruction beyond the stomach, therefore the necessity of further search on the postmortem table in order to detect the true culprit.

9. That cholemia *per se* is not the cause of gastric hemorrhage, but is itself produced by the same factor which is directly concerned in the production of the bleeding, namely, portal obstruction.

10. Post-operative gastric hemorrhages are more common after obstructive gall-bladder operations for two reasons, namely, (*a*) their frequency as compared with other operations in the neighborhood of the main trunk of the portal system; and (*b*) they are usually of a more or less chronic nature, and therefore venous engorgements marked, with possible varices of the esophageal veins and even venous thrombosis and gastric ulcer present.

11. Appendicectomy followed by gastric hemorrhage may be explained by three facts, namely: (*a*) The operation is the most common of all intraperitoneal surgery, the omentum is usually roughly handled, while the appendix itself is connected with the portal system. (*b*) In septic cases it is easy to understand the origin of infected particles being carried higher up, resulting in septic thrombosis. (*c*) The operation being the most common, it follows that the patient may also be afflicted with cirrhosis of the liver, ulcer of the stomach and duodenum or other pathologic conditions which may predispose the patient to gastric hemorrhage.

12. In my own two cases I attribute the death and hemorrhage in Case 1 to septic thrombosis of the gastric vessels, with probable multiple ulceration of the mucosa, as described by Dr. Fowler. Case 2.—Hemorrhage, probably due to a rupture of an esophageal varicose vein. Primary cause, cirrhosis of the liver. Surgical operation, vomiting, etc., exciting factor.

13. Experiments attempting to produce gastric hemorrhage by squeezing the spleen, twisting the omentum,

etc., as practiced by Dr. Rodman, will be of no avail unless one of two conditions obtain, namely: (*a*) The dog must have some chronic portal pathology present prior to the experiment; or (*b*) sufficient time must elapse after the experiment in order that secondary portal pathology be established before the hemorrhage is possible.

Again, being a rare complication in operation on the human omentum, it would naturally follow that thousands of dogs might be subjected to experiments of this character without a single post-operative gastric hemorrhage following.

Ulcer or ulcers of the stomach may be developed as a resulting septic or non-septic thrombosis of the various veins, the thrombosis being a sequelæ of pathology remote from that organ. Therefore, the necessity of looking farther than the stomach for the true etiological factor, even when the ulcer is found. The ulcer is often only a symptom of foreign pathology. I am confident that appendicitis itself is often the initial factor in the production of gastric ulceration, which latter usually passes off unobserved, but may remain as a chronic sore.

## DISCUSSION.

Dr. John P. Lord, Omaha, Neb.—I have not had very much experience along the line indicated by Dr. Macrea's paper. I wish, however, to refer to a case of appendectomy which I performed, in which, on the second day after the operation, the man had hemorrhage from the bowel. I inferred that it was above the seat of the removed appendix, and that it was not due to any fault in the treatment of the stump. The patient was a young man, who was brought to me by a country practitioner, with rather obscure symptoms, supposed to be a case of appendicitis, and I was asked to operate the next day. The man's abdomen was rigid on the right side, and yet apparently his appendix was not markedly involved. I removed it, however, believing that it was the cause of trouble. Afterward I was satisfied in my own mind that probably there was a mistake in the diagnosis; though this was catarrhal appendicitis, yet the

man had in reality a duodenal ulcer, which was the cause of the hemorrhage. Very likely, in a considerable number of these cases of hemorrhage following appendectomy, the real difficulty is either ulcer of the stomach or duodenum. While the report of my case proves nothing, yet I throw out the suggestion that some of these cases can possibly be accounted for in that way.

DR. LEONARD FREEMAN, Denver, Colo.—I recall three cases of vomiting of bile and blood following operations. All three resulted in death. One was an exploratory incision for carcinoma of the liver. Jaundice was present. The making of the incision occupied only a few minutes. The liver seemed carcinomatous. Nothing was done; the incision was closed. The patient could not have been under the influence of the anesthetic more than fifteen minutes. There was fatal vomiting of blood in a short time. In another case of cholecystostomy, which lasted but a short time, the patient died from the vomiting of blood in the course of a few days, in spite of everything that could be done. Autopsy was made, but no peritonitis was present, and there was no infection about the wound or gall bladder. A third case consisted merely in the opening of an appendiceal abscess, in which there were firm adhesions; there was no soiling of the peritoneum, and the patient was under the anesthetic but a few minutes. The patient vomited copiously of blood in the course of twenty-four or forty-eight hours, and died. No autopsy was made.

DR. D. S. FAIRCHILD, Des Moines, Iowa—In opening an appendiceal abscess in a child, 8 years of age, several years ago, the patient died within eight hours thereafter from hemorrhage of the stomach. That has been my entire experience in this direction.

DR. H. D. NILES, Salt Lake City, Utah—I wish to refer to a case which is dissimilar in many respects to any of those that have been reported in the discussion up to this time. The patient was a woman who had suffered for two years, a diagnosis of gastric ulcer having been made, with frequent hemorrhages from the stomach. The symptoms were marked, and apparently there was no question but what the trouble was due to gastric ulcer. At the time I saw this case the surgeons were not operating as frequently as they do now. It was eight or nine years ago. She was confined to bed;

was very much emaciated; pale, anemic, and the stomach tube was used daily, together with other forms of treatment. Incidentally, it was discovered after the case had gone on for a period of two years, during three or four months of which time she was practically bedridden, that she had a dermoid cyst. I do not believe it was with any malignant design that the physicians in the case induced me to perform an operation, but it fell to my lot to remove the dermoid cyst. In removing it, I found that the omentum was firmly adherent around the cyst, dragging down the stomach. I removed the dermoid cyst. She has had no hemorrhage since. In five weeks after the operation she was up and about, and soon afterward her appetite became normal. There is no question in my mind but what that hemorrhage was produced by gastric ulcer, that the gastric ulcer was produced by the omental attachment, and the gastric ulcer was recovered from when the cause was removed.

DR. MACRAE, JR. (closing the discussion)—My idea in bringing this paper before the Association was to elicit considerable discussion, as I find that there are no two men who have the same ideas on it. One surgeon attributes the hemorrhage following operation to one cause, and another to some other etiological factor. For instance, Rodman believed the hemorrhage was due to sepsis. Deaver of Philadelphia, who probably has had as large an experience in appendectomies and in operations upon septic cases of appendicitis as any man in this country, has never seen a case. Dr. Robert Abbe never saw a case. Willy Meyer of New York never heard of a case after a clean operation. Dr. Finney of Baltimore had one case following the removal of the Gasserian ganglion, so that it does not always happen after abdominal operation. The point I wanted to bring out was that this accident may occur after any operation, and to emphasize the necessity of watching these cases and of handling the omentum carefully. Squeezing of the mesenteric veins in one case may not cause a hemorrhage, while in another case it may cause a clot of blood to pass into the portal system higher up, obstruct the parts and a mechanical hemorrhage takes place.

The remarks of Dr. Niles were along the line of thought expressed in my paper, and I believe he is correct in what he has said, and why we should have

hemorrhages following simply the opening of appendicular abscesses is more than I can understand. In some cases a simple abdominal exploratory incision seems to cause gastric hemorrhage. There is nothing so humiliating as a post-operative hemorrhage during the normal convalescence of a patient, who was apparently perfectly well two weeks after operation. I believe this subject is worthy of more careful study than we have heretofore devoted to it, and that we should make an entity of post-operative gastric hemorrhage, and look upon it as a dangerous complication of any operation, but more to be feared after the intraperitoneal manipulations.

Al these cases are interesting, and probably they are more numerous than many of us suppose. I believe portal obstruction is the secondary cause of the hemorrhage in most cases. I have seen a number of reports lately of gastro-enterostomies performed for hemorrhage of the stomach in acute cases. How can we tell, without early symptoms, that the hemorrhage is not due to something else, as cirrhosis of the liver perhaps, or to a careless nurse pressing her elbow into the liver region, or an inflammation of the liver cells themselves shutting off temporarily the circulation, which might have gone on for years without the occurrence of hemorrhage? I recall a case that died of gastric hemorrhage from cirrhosis of the liver, in which I made a postmortem. The man was a great drinker. I was called to see him when I was engaged in general practice. He had not been sick before; he was vomiting blood; he had an immense liver, and died before morning. Postmortem examination showed a liver which was so large as to occupy nearly half of the abdominal cavity. It is impossible to diagnose cirrhosis of the liver early. It can not be done. The disease may go on for years before one can make an accurate diagnosis. Hemorrhage occurs as the first symptom in one-third of the cases. In this man's case the hemorrhage was doubtless due to a debauch. If a postmortem is not made in these cases, the average practitioner will come to the conclusion and say that the cause of the hemorrhage was probably due to an ulcer of the stomach. The majority of these cases are not due to ulcer of the stomach.

# CHOLECYSTITIS, WITH SPECIAL REFERENCE TO ETIOLOGY AND DIAGNOSIS.

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Among the important subjects for the surgeon's consideration, diseases of the gall bladder are, perhaps, second to none; and those most common and of greatest interest are acute and chronic cholecystitis, with their attending sequelæ, empyema, stones, and most of the cases of malignancy of this organ, as well as numerous cases of reflex troubles, such as dyspepsia, disturbances of the heart, moroseness and other nervous diseases, which have for their cause the subject under discussion. Assuming this statement to be correct, then it certainly behooves us, as surgeons, to look well into the causes of the inflammation, which, if understood, will enable us not only to bring about speedy resolution, but in many instances to prevent unpleasant sequelæ that so often follow; and if they should occur, an early understanding of them and their source makes it much easier to find a remedy.

Believing, as we do, that all inflammations are the result of bacterial infection, we do not hesitate to assume that cholecystitis is, no matter what form it takes, a bacterial disease. Not only is the inflammation of the bladder caused by micro-organisms, but the gallstones so often found are formed as a result of their work. In the inflamed gall bladder a great many pathogenic bacteria, principally the coli communis, typhoid, pneumococci and pyogenic, have been found. A question of

much interest is, how can bacteria get into the gall bladder and do such damage in a fluid that is considered aseptic? The home of the *Bacillus coli communis* is in the alimentary canal; in typhoid fever the typhoid bacilli are found here in connection with the duodenal and Peyer's glands. Pyogenic microbes are found in connection with dysentery and in pus, wherever found in connection with the intestines. The pneumococci may enter the general circulation from the lung, or the sputum may be swallowed and the microbes carried, as other microbes are, to the liver through the portal circulation.

We know, too, that the gall bladder is connected with the alimentary canal by the ductus communis choledicus and cystic duct; but infection is not likely to pass up these tracts, as they are constantly filled with or have passing through them the biliary fluid, which is sterile, and constantly washes them away. The infection could not get to the gall bladder through adhesions with the alimentary tract, as this would have to exist first in the gall bladder before the adhesions. The most rational conclusion as to the course of infection is through the portal circulation, whose blood is collected from the alimentary canal and mesentery and then distributed to the liver. In this blood are found the infectious bacteria, which are separated from it by the liver cells, and pass with the bile into the gall bladder. It will hold pathogenic bacteria for a while without allowing them to reproduce themselves; but if bile has these germs in it and they are permitted to remain for any length of time, they will multiply. So we find, by studying this question, that persons who lead a sedentary life, or fast a great deal, are much more liable to have cholecystitis, and especially cholelithiasis. Persons whom we suspect of having a predisposition to stones should not be allowed to take long fasts; on the other hand, they should eat between meals, so as to keep digestion going on all the

time and the viscus empty. The gall bladder only acts as a reservoir for bile to be used in digestion.

I have inquired closely into the past history in the cases that have passed under my observation, and find that a large majority of them have had typhoid fever. This history may in some run back for several years.

In an article written by Dr. Camac,[1] a former interne in the Johns Hopkins Hospital, he said that "Chiari found the typhoid bacilli in twenty out of twenty-three cases." Other statistics are given with a large per cent. in favor of typhoid. There is no question but that these bacilli are the most frequent pathogenic bacteria found, and the microscopical examination of the composition of gallstones shows them in the center of these bodies.

These opinions are only a few out of many as to the sources of gallstones. This theory may at first be doubted, and it may be difficult to understand how stones could possibly come from this source. A Dr. Smith[2] gives a good solution of the question. He says: "When local conditions, or the character of the bacteria, lead to an infection of the catarrhal inflammatory type in the bile tracts, suppuration does not take place, but the deposit of cholestrin and bile salts about a focus of bacterial activity leads to gallstone formation. The colon bacilli and typhoid bacilli have lately been found by numerous observers as the basis of biliary calculi."

After reviewing this subject, we come to the following conclusions: That the most probable cause of infection of the gall bladder is not through the intestinal walls, nor through the hepatic tissue, nor from duodenum through the hepatic ducts, but through the blood of the portal system; and from this source we not only have the catarrhal and parenchymatous inflammations, with occasionaly empyema, but sometimes malignancy caused by the presence of stones.

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1. American Journal of Medical Sciences, 1899.
2. Buffalo Medical Journal, January, 1891.

We now desire to study the diagnosis of cholecystitis. The symptoms which direct us to a proper conclusion are not all present in any one case, and different forms and stages give us different symptoms. Prominent objective points are not always present, and we may have to arrive at a diagnosis by observing minor and subjective signs. Among the most prominent symptoms is tenderness immediately under the ninth intercostal cartilage. This, in my judgment, is as valuable a symptom as tenderness in the region of McBurney's point is for appendicitis. This tenderness may extend down for two or three inches. To elicit it, press the fingers up under the ribs, and require the patient to take a deep inspiration. He will complain of pain, and in many instances, if the fingers are held firmly, the act of inspiration is instantly stopped, as though there had been a sudden attack of pleurisy. There may be some swelling or fullness over the region of the gall bladder, and percussion gives a general sense of uneasiness. By placing the patient on his hands and knees the gall bladder may occasionally be felt to drop forward, and it can be outlined, especially if it contains stones. The stomach is usually deranged, and the patient not only suffers from indigestion, but severe gastralgia, that can only be relieved by emesis. There may be slight jaundice, frequently none, yet the close observer will notice that there are few cases that do not at some time or other show some slight tingeing of the conjunctiva. There may be chills and fever, sometimes two rigors a day attended with high fever, which only lasts for a short time, then disappears. These chills may not return for several days, when they occur as before, and are often diagnosed as chronic malaria.

The patient is usually of a morose disposition, or suffers with great depression at times. Sometimes there is emaciation and again there is irregularity in the heart beats, as well as great excitement of this organ. I had

a patient once who was so nervous and prostrated by this that he could not walk up an ordinary flight of stairs without great exhaustion; and when he stopped he would tremble all over, and his heart beat from 120 to 130 per minute, yet there was no disease of this organ. He had never had any colic nor jaundice, and when I told him what was the matter he would not listen to me until jaundice set in two weeks later, when he permitted me to operate, and recovered. Angina pectoris is sometimes a symptom, and can only be relieved by this operation.

Hepatic colic will aid in forcing a conclusion as to the presence of stones. Still there may be some doubt until they are found in the discharges. These stones are usually found after an attack of colic, and, if they have facets upon them, they show that they have had companions to rub against. After the passage of stones through the duct, the tenderness is usually increased. Occasionally the gall bladder becomes very much distended, and will reach as low as Poupart's ligament. It may be mistaken for an appendicular abscess, and only an exploratory incision or aspiration enables us to determine which is present.

I have noticed in several cases where the gall bladder was full of stones, or where there was empyema or hydrocholecystitis, that the administration of calomel and other active cholagogues, increased pain in the region of the liver; and this pain was often attended with general tenderness over the organ. I can only account for such pain in this way: There being no bladder for the residue of bile, the ducts become overdistended and a condition of cholangitis is excited.

As to the treatment, we will not enter into the discussion of this subject extensively. It is divided into both medical and surgical, but I believe when the acute inflammation has subsided, and a chronic condition is established, that but little can be accomplished by medic-

inal treatment, and an operation is justifiable whether there is evidence of stones or not. In fact, I think a man may live much longer with stones in the gall bladder than he can from many other conditions, and the surgeon is not required to take generally as active measures, when there are stones, as when there is empyema, hydrocholecystitis or a general catarrhal condition. To operate and establish thorough drainage is certainly the thing to do.

As to the use of medicine to prevent the formation of stones, I think there is little benefit in it. I have thought after using olive oil thoroughly for weeks and months that it was of decided benefit. It does certainly relieve the attacks, although its constant use becomes very nauseating. The question is, how can olive oil be of service? Stewart gives the following explanation: "With unobstructed pancreatic flow it is not improbable that by virtue of the fat-splitting ferment, *stepsin,* a portion of the oil is dissociated in the duodenum into its components, fatty acid and glyceryl, and nascent glycerin is formed, and exerts in the duodenum an effect somewhat analogous to that which takes place when glycerin is introduced into the rectum, withdrawing water, causing hyperemia and inducing irritation of the efferent nerves of the part with which it comes into contact, and thus leading to active reflex peristalsis."

The sodium phosphates and other agents have been advised without limit, but I do not believe we can hope to get any substantial benefit short of the knife.

# THE ANATOMY AND PHYSIOLOGY OF THE PERITONEUM AND THEIR RELATION TO PERITONITIS.

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In considering the anatomy or physiology of the peritoneum, it is still necessary to accord the so-called stigmata and stomata a preliminary consideration. I devoted a paper to the discussion of these structures a few years ago, and I shall present a few excerpts from it as a preliminary to the further discussion of my subject. You will recall that it was Oedmasson who first described the occurrence of dots and rings in the intercellular lines when a serous surface was treated with a silver nitrate solution and exposed to the sun, according to the method of Recklinghausen. These structures were regarded at first indifferently, and later on were connected with the process of absorption. It was not until Cohnheim presented his theory of inflammation and the discovery of the stomata in the blood vessels by Arnold, that these structures received very marked attention. How much influence they have had in the explanation of the processes of absorption and exudation every one knows. For many years their existence was not questioned. In later years a few dissenting voices have been heard denying their functional importance while admitting their actual existence.

A good representative of the doubters was Toldt, who said that the stomata were structures occurring in the intercellular lines when a serous surface was treated with

silver, which could not be prevented, but regarding whose function nothing was known. Muscatello, who has had a greater influence on the present opinion than any other writer, accepted them for the diaphragm only, and ascribed to this organ the chief office of absorption. You will all recall that it was on the basis of this man's paper that Clark based many of his recommendations in the prevention and treatment of peritonitis.

In taking up the study of these structures I started from the very trite observation of Ranvier that the occurrence of the stomata could be very much lessened by a preliminary rinsing of the membrane before the application of the silver. He asks what structures these are that they may be washed off with distilled water? I believe my paper was the first definite answer to his question.

It is not necessary to follow all the steps in my studies, and I may be brief in saying that I declare the stomata to be artefacts and have no existence in fact, and for the following reasons: I found that by injecting a very dilute solution of silver nitrate into the free abdominal cavity of a living animal I was able to obtain whole abdomens with the cells sharply outlined without a single stoma appearing. By using other methods, as osmic acid and iron-tannin, no stomata are seen. By causing a serous surface to adhere to a slide and then stripping all off but the endothelial layer and subsequently staining with the fuchin, the cell outlines are sharp and no stoma appear. If, then, animals can live without the stomata, it is obvious that they can not be essential structures.

Being convinced that they were artefacts, it seemed to me desirable to determine their exact morphogenesis. As a preliminary to this study I thought to enlighten myself on the chemistry of the silver albuminate, as the product of silver acting on the serous substance is universally called. I was very much surprised to discover

that there was in fact no such thing as a silver albuminate, and that the designation "silver albuminate" was a bold assumption. Following out this line I experimented with albumin solution and silver solution on a slide, and discovered that rings quite like the stomata were formed independently of the peritoneal surface. The exact process could be thus followed, and the spurious nature demonstrated beyond a question. I may but add that it seems probable that the so-called silver albuminate is merely a silver chlorid formed by the precipitation of the silver by the chlorids in the peritoneal fluids.

I may here insert a word as to the nature of the fluid between the cells. It probably has some of the offices ascribed to it, namely, those of a cement, though this is a difficult problem. I may here add one point as to its chemical nature of interest to all who use ether as an anesthetic. This point is that this intercellular substance is soluble in ether, and that in the inhalation of ether more or less of this cement substance is dissolved so as to loosen these cells from their base, or even to allow them to become free in the lumen of the alveolus. Even if the cell is not loosened, the absence of this fluid, as may be proven by the failure of the cell outlines to be shown by the action of silver nitrate, may allow infectious agents to enter. By an intense action of the ether the cells lining the blood vessels may become affected, allowing extravasation of leucocytes and even red cells. With these cells loosened or absent the access of micro-organisms and circulatory disturbances and subsequent pneumonias may be easily understood. I am looking for some substance to mix with ether which will make it incapable of absorbing this cement substance.

The endothelial covering of the peritoneum is formed by a layer of flat cells, irregular in outline, containing a large oval faintly staining nucleus. I want to call attention to the fact that under some conditions there may be more than one layer. This condition may occur over

the pregnant uterus, over the fallopian tube in tubal pregnancy, in a variety of inflammatory conditions, and in some animals at least, in normal conditions. In the normal peritoneum there are under the basement membrane large cells with oval nuclei which stain like those of the endothelial cells proper. There are, besides, the clasmatocites of Ranvier. When these endothelial cells become more than one layer deep the under cells resemble more closely those ordinarily found under the elastic layer. This would suggest the probability that the endothelial cells, when destroyed, are replaced by cells from below.

The endothelial cells have been described by Kolossow as being composed of two parts, a superficial homogeneous part, the so-called cover-plate containing no nucleus and a deeper part, the cell proper, containing the nucleus. I found in repeating his experiments that I could tease off his cover-plate and with it came the nucleus, thus proving that his cover-plate is the cell, and what he deemed the cell is in fact the basement membrane below containing the large cells already referred to. It is necessary to distinguish this so-called cover-plate from a layer frequently appearing in peritoneal irritation. This can easily be done when it is remembered that the cell proper stains most deeply with acid stains, while this spurious membrane stains most deeply with neutral stains, thus suggesting its mucinous nature. I believe this to be the truth, and I interpret it to be the answer of the membrane to irritation, for I have found it most frequently in the slighter forms of the inflammatory process. The leucocytes are found under this membrane and above the endothelial cells. The endothelial cells may be found in place in inflammations of some severity. My researches confirm the statement of Ranvier that the cells contract in inflammation.

Under the endothelial cells is the basement membrane.

It is formed of a network of elastic fibers. Under this is the connective tissue, lymph and blood vessels. Both of these systems form complete channels. Neither have a direct connection with the surface of the peritoneum. It will thus be noted that in passing from the peritoneal surface into a lymph or blood vessel, it must pass between the endothelial cells, through the intervening space taken up by the elastic layer and between the cells lining the lymphatic or blood vessels. The spaces between the cells outside of the vessel walls are no more lymph spaces, as they are commonly called, than they are blood spaces. Fluid can be injected into the free peritoneal cavity from either system of vessels. I have frequently injected the peritoneal cavity tense full with fluid from the aorta without causing any lesion of either the vessel wall or peritoneal surface.

The rapidity with which fluids are absorbed from the peritoneal cavity is in general known. This question need not be entered into except to state that of all fluids normal salt solution, with the exception of Tavel's solution, is most rapidly absorbed. Higher percentages of Na Cl solution are absorbed much more slowly.

The classification and pathogenesis, too, of the diseases of the peritoneum may be passed over with the statement that the subsequent remarks have to do with acute diffuse peritonitis only experimentally produced in animals. In the treatment of this condition we have a large surface for absorption covered with a greater or less amount of fluid containing bacteria in large numbers, and their toxins. The accepted treatment, in accord with the general principles of surgery, is to drain this surface. In this condition there is relatively little that is caused to escape from the abdomen through the incision. Recourse is had to irrigation or to the filling of the abdomen with fluid and closing it again. The fluid selected for this purpose is normal salt

solution. This fluid is, as already mentioned, absorbed most rapidly of all fluids, and therefore, the absorption of toxins is hastened. Believing this practice to be erroneous, I utilized my previous researches in anatomy and absorption to find a way to limit the entrance of the toxins into the general circulation. The ideal way would be to cause an exudation on to the peritoneal surface instead of an absorption. This not only would not allow any of the toxins to get into the circulation, but would constantly bring new serum to the surface to combat the invading enemy.

I have been able to establish experimentally three means for lessening absorption, and to a certain extent I venture to hope to produce an actual exudation on to the surface of the peritoneum. These are: 1. By modifying the condition of the blood. 2. The character of the fluid to be absorbed. 3. The temperature of the fluid to be absorbed.

1. In the hydremic state absorption is lessened. I was able by producing an extreme degree of hydremia to all but prevent absorption. For example, in injecting 60 c.c. of Na Cl solution into the peritoneal cavity of a guinea-pig I was able to regain 50 c.c., after injecting 180 c.c. under the skin during the interval.

2. The character of the fluid. I could find but one substance which would, in harmless strengths, remain unabsorbed and even cause exudation. This substance is formalin. In solutions of 1:10,000 the absorption is almost *nil* and an albuminous exudation takes place. Thus when 60 c.c. of the given strength was injected 60 c.c. of albuminous fluid could be collected, which would coagulate after cooling, indicating that a large amount of albuminous material had escaped from the vessels into the peritoneal cavity. I have made some experiments to determine the toleration of animals for formalin. I injected solutions of varying strengths intravenously. Only when a strength of 1:200, and in

quantities of 250 c.c., was death produced in a dog weighing thirty pounds. In a solution of 1:1,000 or weaker I have never succeeded in killing an animal, no matter what the amount used.

3. The temperature of the fluid. If a fluid is heated and kept heated absorption is lessened, and if hot enough is entirely prevented. This may be determined in two ways: either by keeping the fluid heated by keeping up a constant circulation and measuring the resultant fluid after a given time or by irrigation, using strychnin as an indicator and determining the rate of absorption by the time convulsions appear. In general, it may be stated that in temperatures above 40 C. absorption becomes rapidly less.

Interpreted into clinical terms, my proposal for the treatment of peritonitis is as follows: 1. Produce an artificial hydremia by the subcutaneous injection, or rectal injection in less urgent cases, of salt solution. Such a state of hydremia must not be produced as will cause a rise of blood pressure. From experiments now under way, confirmed by clinical experience, I am disposed to believe that much harm has been done by a promiscuous injection of salt solution in all manner of conditions regardless of the need of fluid. The point must always be kept in mind that if enough is injected to produce a rise in pressure the work of the heart is very much increased, which may quickly exhaust a weakened organ. 2. Irrigation more or less constant with a weak formalin solution. 3. The solution should be hot, say 45 C.

# PRIMARY SARCOMA OF THE SPLEEN AND ITS TREATMENT BY SPLENECTOMY.

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Believing that the advancement in any field of science must result largely from the accumulated experience of the workers in that field, leads us to present the clinical history and pathological findings of a case of fibrosarcoma of the spleen.

Miss O. S. of Kenross, Iowa, entered the University Hospital May 13, 1903, at the request of her physician, Dr. Clarence C. Heald, giving the following history: Age 15. Her family history, as well as her past history, was negative so far as having any bearing on her present condition. She had never suffered from malaria, any septic process or any injury that she had any knowledge of. In fact, she had considered herself well until the early manifestations of her present trouble, which consisted in the appearance, about five months previous, of an enlargement in the left hypochondriac region, particularly noticeable upon standing or lying upon her right side. The growth had been gradually increasing in size. It caused her no particular discomfort, aside from a slight dragging sensation after walking about for some time, and the knowledge that there was something wrong as manifested by the presence of the mass which she could

feel in the abdomen. Her general appearance was that of a person possessed of good health and well nourished. Physical examination of the various organs of the economy gave no evidence of the existence of any abnormality, excepting the spleen, which was in question. No evidence was obtainable indicating that any organ was performing its functions imperfectly.

Urinalysis negative. The same may also be said as regards the blood examination.

*Physical Examination.*—Inspection of the abdomen, while the patient was lying upon her back, revealed nothing abnormal excepting a slight fullness of the left hypochondriac region. Upon changing her position to the right side, or in standing, the mass was found to descend downward, forward and inward to the extent that its lower border was about two inches below the umbilicus, seemingly hugging the anterior abdominal wall. The growth, upon the patient assuming the dorsal posture, would recede to the left hypochondriac region. It was not influenced by diaphragmatic movement. Percussion of the colon, with a view to determining its relationship to the growth, when the same was displaced downward, led to some question as to whether the growth was of splenic or renal origin, as the colon was found to pass over the lower part of the growth. Upon palpation the mass was found to be an elongated one, in the upper half of which the more or less sharply defined edges, indicative of splenic structure, could be fairly well made out; while the lower half of the mass seemed to be more or less lobulated, very dense and indistinctly merging with the upper portion of the growth. No splenic fissure could be made out. A diagnosis of a solid growth of the spleen was made.

On May 19, 1903, the patient was operated upon, through an incision made along the outer border of the left rectus muscle, having its origin an inch below the costal cartilages and terminating about two inches below the level of the umbilicus. This was joined at

right angles by another incision about three inches long, running out into the iliocostal space. Before the peritoneum was opened, the purple colored spleen was already recognizable. The spleen was easily brought forward through the wound and ligation of its pedicle, consisting of the gastrolienale ligament in which coursed all the splenic vessels but one, was readily accomplished by double ligation, before the spleen was removed. The mesocolon, having been dissected up by the spleen, was opened through its outer border, which was subsequently closed. Owing to the slight oozing from this area, a stab wound in the iliocostal space at the outer border of the kidney was made, into which a cigarette drain was introduced, which was removed on the second day.

Recovery uneventful. She left the hospital on the twenty-fourth day.

*Present Condition.*—On Dec. 22, 1903, upon request, she presented herself at the hospital and the case was carefully gone over. Her general appearance was that of a person in good health. She expressed herself as having been in perfect health since her return home. Menstruation had been normal the past five months. Examination of the various organs was negative. Abdomen palpable without pain or undue rigidity. The region occupied by the spleen, as well as the contiguous structures, were free from induration, the liver seemingly normal.

*Blood Examination.*—A blood examination was made two days prior to the operation and at intervals of two to three days following the operation. The patient was quite anemic and had a moderate leucocytosis before operation. After the operation, the red corpuscle count fell for several days, then gradually the number increased. A marked leucocytosis was present immediately after the operation, which continued as long as the examinations were made. The amount of hemoglobin varied in proportion to the number of red corpuscles. Some poiki-

locytes, microcytes, macrocytes and nucleated red corpuscles appeared, especially after the operation.

BLOOD EXAMINATIONS.

| Time of examination. | No. of red corp. per c.mm. | No. of white corp. | Per cent. of Hemog. |
|---|---|---|---|
| 2 days before operation | 5,260,000 | 6,120 | 72 |
| 1 day after operation | 3,346,000 | 22,200 | 64 |
| 3 days after operation | 3,116,000 | 24,500 | 58 |
| 5 days after operation | 3,820,000 | 16,200 | 62 |
| 9 days after operation | 3,810,000 | 23,400 | 62 |
| 13 days after operation | 4,360,000 | 27,000 | 61 |
| 17 days after operation | 4,330,000 | 24,560 | 60 |
| 21 days after operation | 4,320,000 | 23,120 | 62 |
| 24 days after operation | 4,336,000 | 23,220 | 63 |
| Dec. 22, 1903, the seventh month after | 4,420,000 | 10,810 | 84 |

The entire specimen, consisting of spleen and tumor mass, is 17.5 cm. long, and varies in width and thickness at different places, as will be described later. It weighs 256 grams, about one-fourth of which represents the weight of the spleen, the remainder the weight of the tumor. The tumor is attached to and apparently occupies the lower portion of the spleen. It is quite well encapsulated. The capsule of the tumor and the line of demarcation between the spleen and tumor is not easily distinguishable, so that the tumor mass appears to be continuous with the splenic substance.

The tumor is rather spherical in general outline and has a circumference of 23.5 cm. The surface of the tumor presents a rather nodular appearance, which is most marked along the lower and external surface. The mass is quite hard and firm, considerably more so than the spleen and is of a dark purple-red color, a color practically the same as that of the external surface of the spleen.

The specimen was cut in such a way that the incision extended along the middle of the external or phrenic surface of the spleen and then continued through the tumor mass. The cut surface of the tumor area is of a bright red color, quite uniform over the entire surface, but here and there are found dense bands of tissue of a white color with a slight tinge of blue. The dense bands are at certain places 4 mm. wide, at other places they appear as delicate threads. Some of them appear to be

sharply defined from the surrounding red colored tissue; others seem to diffuse gradually into the surrounding substance. The dense fibrous tissue is rather irregularly distributed and it is the contraction of this tissue that accounts for the place on the external surface, producing a depression about 1 cm. deep. The upper portion of the tumor fits into a concavity made by the base of the spleen. The upper border of the tumor is readily recognized and easily distinguished from the splenic substance by the bright red color of the former as compared with the yellowish brown color of the latter. At one place, however, the border line is not so readily noted. It appears as if there has been a slight interchange of splenic and tumor substance. Although apparently well circumscribed, a distinct connective tissue capsule is recognizable only at the periphery, where a small strip which is connected with the capsule covering the spleen and tumor externally extends inward between the spleen and tumor for about ½ cm. on all sides. The tumor is 9¾ cm. long, 8¼ cm. wide and 7¾ cm. thick.

The spleen itself appears to be but little affected. It has a pyramidal form, the base in contact with the tumor. The base is, however, not represented by a flat surface, but has considerable of a concavity which lodges the upper portion of the tumor mass. At the base the spleen is 7 cm. wide and 4 cm. thick. The apex comes to a quite sharp point. The external or phrenic surface presents a normal convexity, and is 7 cm. long. The intermediate ridge separating the gastric from the renal surfaces is quite well marked and is 7 cm. in length. The gastric surface is flat and only 3.5 cm. wide at the base. The anterior margin is 11 cm. long and contains no notches. The posterior border is more blunt and is only 8 cm. long. The hilum is located on the gastric surface, beginning 6.5 cm. below the apex of the spleen, at first adjacent to the intermediate ridge, then extending outward and downward toward the anterior border,

terminating at a point between the spleen and the tumor, 2 cm. from the anterior border of the spleen. The ligaments constituting the pedicle of the spleen have an attachment extending from above the hilum downward, covering the internal surface of the tumor for 2¼ cm. The vessels passing into and coming from the organ all enter the spleen directly through the hilum, with the exception of two, which enter the substance of the tumor. Spleen has a normal dark purplish red color and is normal in consistency. The size of the spleen as compared with the size of the patient seems to indicate that there has been but little, if any, destruction of splenic substance.

On microscopic examination it is found that different portions of the tumor present different conditions. In most places there is found a dense field of cells, some of which are round, but the majority are spindle shape. Most of the cells have a large nucleus rich in chromatin and surrounded by a small amount of cytoplasm; in others the cytoplasm is large in amount. Between some of the cells there is found the distinct elements of fibrous connective tissue. The dense white areas noted above are made up of an almost homogeneous fibrillar connective tissue, containing only a few nuclei.

The blood vessels of the tumor are very poorly formed, most of them lined simply by endothelial cells or by the tumor cells themselves. In certain places a number of red corpuscles are seen lying free between the tumor cells. A section through the specimen at the place where the tumor borders on the splenic substance reveals the absence of a distinct capsule. The border line between the two structures can, however, be fairly well determined. The splenic tissue lying adjacent to the tumor substance consists of normal splenic elements very closely crowded together, even more so than are the cells of the malpighian corpuscles. In this dense splenic tissue, which is from ¼ to ½ cm. wide, no blood vessels were found, and only here and there an occasional red

corpuscle, so that this tissue can really be considered as a limiting membrane, preventing any rapid spread of the tumor into the substance of the spleen proper. The splenic tissue elsewhere appears to be normal.

The microscopic examination places the tumor as a fibrosarcoma.

That the spleen is not an organ essential to the maintenance of a fair degree of health has had abundant proof through the numerous splenectomies of the past half century. Thus, of the 274 cases of extirpation of the spleen, which it was possible for Vanverts to report in 1897, 170 recovered, while the 360 cases collected by Hagan in 1900, give a mortality of only 38.3 per cent., and we have no doubt that were statistics obtainable to the present time an equally good, if not a much better showing could be made. The result is that the spleen is being rapidly forced into that large list of organs which are being subjected to operative procedure on the part of surgeons. Of these procedures, splenectomy has won for itself a fixed place and must henceforth be looked upon as a rational means of treatment in certain pathologic conditions of the spleen. Yet, when we come to a consideration of what these conditions are which shall form such indication, we realize that much remains to be done in this direction, and in no particular class of cases is this more evident than in the treatment of neoplasms of this organ. The paucity of accumulated experience of the profession may be considered as responsible for this to a large extent.

It has long been recognized as a fact that the spleen is possessed of a relative immunity to secondary involvement by new growths, while the existence of malignant neoplasms having their origin primarily in this organ has been so infrequently observed that some doubt has been expressed as to their existence. Litten[1] states that "primary sarcoma of the spleen is very rare." Mosler, in his work upon "Diseases of the Spleen," in

1. Nothnagel's Series, vol. viii, 1898.

1875, knew of no case, and B. Grohe[2] writes as follows: "Tumors of the spleen recognizable during health occur very seldom. Of heteroplastic tumors of the spleen only a few cases are known. Primary sarcoma appears more than doubtful, while primary sarcoma of the spleen is extremely rare."

Weichselbaum was the first to report any cases of primary sarcoma, if we exclude the case reported by Freidrich in 1865, under the title of "Multiple Nodular Hyperplasia of the Liver and Spleen," which Bunting, however, believes to have been a primary sarcoma of the spleen. Weichselbaum[3] states that until that time there existed no records of any cases in medical literature. He then proceeds to report two cases. Since that time there may be found scattered through medical literature, reports of a fair number of cases, which have been recorded as primary malignant neoplasms of the spleen. We herewith append a list of those so far recorded. The total number of which we have been able to gather from various sources is 32, including the one here reported. It will be understood that much doubt must exist as to whether all of the cases included in this number rightfully belong there, as some of the cases were recorded as such without having their true nature determined by careful microscopic examination of the specimen; and in some of the cases the clinical history and gross findings are at variance with our present conception of primary neoplasms, as will be pointed out later in dealing with the operative cases.

Of the above thirty-two cases, twelve were subjected to operative interference, eleven to splenectomy and one to enucleation of the growth. The latter case was that of Heinricius, in which instance there no doubt existed a pedunculated primary fibrosarcoma of the spleen, developing from its capsule, which, at the time of the operation, was looked upon as a benign growth, and

2. Virchow's Archives, 1897.
3. Ibid., 1881.

was consequently subjected to enucleation, with the result that probably a portion of the growth remained through which recurrence took place. It was only after a microscopic examination of the growth was made that it was found to be a fibrosarcoma with myxomatous degeneration. Heinricius expresses himself as follows regarding this case: "Had I known at the time of the operation that the growth was malignant, it would have been more proper to have extirpated the spleen, although the organ itself appeared, and evidently at the time was, normal. Case died seven days after the operation."

Of the eleven splenectomies, three died following the operation, namely, the cases of Flothmann, Collins and Krylow. The case of Flothmann was that of a man aged 44 years, cachectic, possessed of a four-pound splenic growth, which was adherent upon all sides to adjacent structure. At the termination of the operation there was observed the existence of a tumor about the size of a man's fist, in the omentum. Its removal was also undertaken. Death followed fifty hours later from acute anemia. The spleen was studded throughout with innumerable small growths, some as large as a hazelnut. As this case presents a picture somewhat typical of metastasis to the spleen, it is believed there exists some reason for excluding it from among primary sarcomas of the spleen.

The case of Collins was that of a male, aged 36, who had suffered severely from malaria ten years previously while a soldier in the English army in India, since which he had, however, been apparently well until two months prior to the operation, at which time he noticed a growth in the left side, which was increasing in size and at times was painful. He had lost fifteen pounds in weight in these months. No other symptoms existed. Blood examination revealed white corpuscles 5,000, hemoglobin 60 per cent. At the operation, Jan. 11, 1900, the spleen was found to be extensively adherent

to surrounding structure. A portion of the pancreas was removed with the growth. A portion of the spleen not effected by the growth was allowed to remain attached to the cardiac end of the stomach. Death followed on the sixth day, due to acute general peritonitis, pleuritis and streptococcus septicemia. Growth consisted of a small round cell sarcoma, about the size of two fists, and a sarcomatous mass size of palm of hand with some pancreatic tissue and a small supernumerary spleen about size of walnut.

In the case of Krylow, which we quote from Simon, he having quoted the same from "Hildebrand's Jahresberichten," splenectomy was undertaken in a patient 51 years old, much emaciated; much hemorrhage resulted from the operation, the patient dying four hours later. The tumor was reported to be a sarcoma, weighing eight and one-half pounds, which had existed for three years. The remaining eight cases which recovered from the immediate effects of the operation are as follows:

Case of Billroth, reported by Von Hacker. Patient, female, age 43. Tumor and spleen of large size, weigh- 1,450 grams. Tumor was smooth in front, but possessed of a protuberance posteriorly. Lower border divided by three fissures. The tumor was quite painful on pressure, which pain was reflected to left shoulder. The same was diagnosed by Billroth prior to operation as a sarcoma. The spleen was removed, it being the first case of splenectomy for sarcoma. The tail of the pancreas was found adherent to the tumor growth, 7 cm. of which was removed. The tumor was 75 cm. in circumference, 25 cm. in length and 18 cm. in width. Microscopic examination showed it to be a lymphosarcoma. The growth had probably existed over ten years, as for that length of time, at least, there had been observed a marked fullness in the upper left quadrant of the abdomen, and for seven years there had existed two growths of a size sufficient to be palpable. The last two years

were marked by rapidly increasing growth. Three weeks subsequent to the operation there existed a slight leucocytosis. The patient died six months later from recurrence.

Jordan's case was that of a patient 15 years of age, who, in June, 1895, was subjected to an operation by him for the removal of an enlarged lymph node, about the size of an egg, from the submaxillary region of the left side, which microscopic examination seemed to indicate as being a lymphosarcoma. Some time later the patient began suffering very severely from pain in the splenic region, and in August, 1896, the spleen was removed. It was found to be the seat of a sarcoma with metastasis in the structure of the hilum. The patient is supposed to have died of recurrence. May it not be that this case should be expunged from the list of primary sarcomas of the spleen, owing to the fact that it may have been secondary to the sarcomatous lymph node previously removed?

In the case operated upon by Professor Kocher, no definite history is possessed as regards the case, excepting that the spleen was the seat of a lymphosarcoma, with many regional metastases involving the liver and mesenteric lymph nodes. It was considered by Vulpius, Braun, Litton and others as a primary sarcoma of the spleen. Simon, however, has raised the question as to whether the patient did not suffer from a generalized lymphosarcoma, in which process the spleen became secondarily involved.

As regards the case of Herczel, we again quote from Simon, who quotes the same from "Hildebrand's Jahresberichten." The case was that of a 14-year-old boy, in which a growth had been noticed for one week. The extirpated spleen measured 25x19 cm. and weighed 2,456 grains. Within the otherwise perfectly normal spleen, there existed what was considered a primary sarcoma of the spleen about the size of an apple. Following the operation there existed a marked leucocytosis,

## CASES REPORTED AS PRIMARY SARCOMA OF SPLEEN.

| No. | Age. | Sex. | Reported by | Spleen. | Other Organs. | Symptoms. | Classification of Growth. |
|---|---|---|---|---|---|---|---|
| 1 | 56 | M. | Freidreich, 1865. . | Postmortem specimen. Spleen seat of very small tumors, varying in size from those being just visible to the size of a pea. | Liver was involved by similar growths. | . . . . . | Primary endothelial sarcoma of spleen. (So classified by Bunting.) |
| 2 | 21 | M. | Weichselbaum, 1881. | Spleen much enlarged with nodular growths throughout its structure. | . . . . . | . . . . . | Primary endothelial sarcoma. Birch-Hirschfeld classed it among the nodular hyperplasias. |
| 3 | 21 | M. | Weichselbaum. . . | Tumor arose in substance of spleen from which it was easily separable and projected above the convex surface. | No metastasis . . . . . | . . . . . | Primary fibrosarcoma. |
| 4 | 55 | F. | J. Weber, 1901. . . | 24x10x17 cm., about one-fourth of which appeared normal; remainder being of a uniform grayish color. | Metastasis in mesentery, omentum and retroperitoneal lymph nodes. | . . . . . | Lymphosarcoma.. |
| 5 | 39 | M. | Schönstädt, 1891 . | . . . . . | No metastasis . . . . . | . . . . . | As mixed tumor, partly of the nature of a fibroma and partly endothelioma. |
| 6 | 20 | M. | Grohé, 1897 . . . . | 28x13x18 cm. Permeated throughout by nobular growths. but small amount of splenic pulp. | It was adherent to diaphragm, stomach and left lobe of liver. | History of a previous fall followed by pain in left side. Hemoglobin 70%; red, 4,640,000; white, 15,400. | Lymphosarcoma. (Birch-Hirschfeld believed it to have been a large-celled hyperplasia. |
| 7 | 49 | M. | Bunting, 1903. . . | Spleen enlarged, weighing 250 grams. Bulk of organ appears to be made up of grayish opaque tissue. | Metastasis to liver, pancreas, gastro-hepatic lymph nodes and subcutaneous tissue. | Had been incapaciated for labor before death by reason of pain and discomfort for a period of only 16 days. | Primary endothelial sarcoma. |
| 8 | 54 | F. | Casott . . . . . | 5,000 grams. | Metastasis throughout the abdomen. | . . . . . | Primary round-celled sarcoma. |
| 9 | 28 | F. | Woodruff. . . . . | Pedunculated tumor arising from the spleen. | . . . . . | . . . . . | Primary sarcoma. |
| 10 | 13 | M. | Sacelli, 1876. . . . | Weight of spleen, 2400 grs . . | Metastasis liver, gall-bladder and ascending colon. | Patient had previously suffered from malaria. | Primary lymphosarcoma. |
| 11 | . | . . | Trélat. . . . . | . . . . . | . . . . . | . . . . . | Primary lymphosarcoma. |

12, 13, 14. Picon, Ramond and Bovaird have also reported cases of sarcoma of spleen. The pathological picture varies from sarcoma of spleen, chiefly in the greater development of connective tissue in the spleen, which one would expect from the greater chronicity.

## CASES REPORTED AS CARCINOMA OF SPLEEN.

15, 16, 17, 18, 19. Moslier, Parker, Perry, Bridges and Clark have reported cases of carcinoma of spleen. As microscopic examination was made only in the last two, they should probably be classified either among the sarcomata or splenic anemias.

Notte's Case 20, considered by Litton as a sarcoma of the kidney.

## CASES SUBJECT TO OPERATION.

| No. | Age. | Sex. | Reported by | Splenectomy. | Result | Spleen. | Other Organs. | Symptom. | Classification of Growth. |
|---|---|---|---|---|---|---|---|---|---|
| 21 | . | . . | Heinricius . . | Enucleation of growth, by Heinricius. | Death 7th day. . . | Pedunculated fibro-sarcoma arising from spleen. Weight 500 grams. | No metastasis. . . . . | None except as manifested through presence of growth. | Primary fibro-sarcoma. |
| 22 | 54 | M. | Flothmann. . . | Splenectomy by Flothmann. | Death 50 hours after the operation from symptoms of acute anemia. | Splenic tumor w'ghed 4 lbs. and permeated by innumerable small growths, largest size of hazelnut. | Extensive adhesions. Growth size of fist in omentum. | Not given. . . . . | Primary lymphosarcoma, |
| 23 | 51 | . . | Krylow . . . . | Splenectomy, by Krylow. | Death followed 4 hrs. after operation from acute anemia. | Spleen and tumor, weight 8½ lbs. | Extensive adhesions involving pancreas and stomach. | None except presence of growth. | Primary small round-celled sarcoma. |
| 24 | 36 | M. | Collins, 1901. . | Splenectomy, by J. C. Collins. A portion of spleen left attached to stomach. Part of pancreas removed. | Death 6th day after operation of general peritonitis, pleuritis and streptococcus septicemia. | Size of growth, that of two fists. | Extensive adhesions to pancreas and stomach. | No symptoms except presence of growth in left hypochondriac region and loss of weight. | Primary small round-celled sarcoma. |
| 25 | 43 | F. | Von Hacker. . | Splenectomy, by Billroth. | Recovery. Died 6 mos. later from recurrence. | Spleen and growth weighed 1450 grs. and measured 25x18 cm. | No adhesions on convex surface. Omentum and loops of intestine adherent at concave surface; 4 cm. of spleen removed with growth. | For 7 yrs. had noticed growth size of two fists in left hypochondriac region. Rapid growth last 2 years. Marked pain. | Primary lymphosarcoma. |
| 26 | . . . | | Kocher . . . . | Splenectomy, by Kocher. | Recovery. Subsequent death from recurrence. | Spleen uniformly enlarged. | Metastasis liver and mesenteric lymph nodes. | . . . . . | Primary lymphosarcoma. |
| 27 | 15 | . . | Jordan* . . . . | Splenectomy, by Jordan. | Recovery and subsequent death by recurrence. | Sarcomatous growth in spleen metastasis into hilum. | 14 mos. previous to splenectomy an enlarged submaxillary lymph node removed which was a lymphosarcoma. | Pain in splenic region and enlargement in same region. | Primary sarcoma. |
| 28 | 14 | M. | Herczel. . . . | Splenectomy, by Herczel. | Recovery. Subsequent history not given. | Spleen and growth w'ghed 2450 grs., measured 28x19 cm. Sarcomatous gro'th structure size of apple. | No metastasis. . . . . | Presence of growth recognized only 1 week before the operation. No other symptoms recorded. | Primary round-celled sarcoma. |
| 29 | 29 | F. | Wagner, 1894. . | Splenectomy. . . . | Recovery. No recurrence. | Weight 1285 grs. Size 19x9½x10 cm. | No adhesions, no metastasis. | 7 wks. after last confinement, which was normal, noticed growth in left hypochondriac region. No discomfort from it. Blood count normal. | Primary endothelial sarcoma. Bunting. Round-celled sarcoma. Marchand. |
| 30 | 31 | F. | Fritch. Reported by Asch. | Splenectomy, by Fritch. | Recovery uneventful. Normal confinement 8 mos. after operation. Died 6½ yrs. after operation of cardiac lesion. | Weight of spleen and growth, 2 kg. Size 22x14x10 cm. | No adhesions and no metastasis. | Severe pain for 3 or 4 mos. prior to operation. Pregnant 5 weeks. Tumor in left hypochondriac. | Primary lymphosarcoma. |
| 31 | 37 | F. | Simon. . . . . | Splenectomy, by Garré. | Recovery. Condition of patient good at end of 1 year. | Spleen and gro'th weighed 1750 grs. and measured 22x13.5x11 cm. | No adhesions and no metastasis. | None except some pain and the presence of the growth. Duration of growth not given. | Primary round-celled sarcoma. |
| 32 | 15 | F. | Jepson and Albert. | Splenectomy, by Jepson. | Recovery. Condition of patient good at end of 10 months. | Spleen and tumor weighed 236 grs. Tumor weighed 190 grs. and measured 9½x3, ¼x1¾ cm. | No adhesions and no metastasis. | None except those of presence of growth, which was recognized 5 mos. prior to operation. | Primary fibro-sarcoma. |

* Doubt may exist as to its being a primary sarcoma owing to earlier lympho-sarcoma in neck.

the patient recovering, but as regards subsequent history nothing is known.

The case of Fritch was that of a woman aged 31, multipara, who had since March, 1887, suffered with severe pain in the region of the spleen, at which time a small tumor had also been observed in the hypochondriac region, which grew rapidly until June 24, 1887, at which time she was operated upon. Blood examination in this case was normal. The recovery was uneventful, and on November 24 of the following year she gave birth to a stillborn child. The woman died six and one-half years later of what was presumed to have been a cardiac lesion; no postmortem was obtainable. The spleen was seemingly normal, excepting at one point upon its convex surface, where existed the growth in the splenic structure, which upon section seemed to be well circumscribed, although not sharply so, from splenic structure.

Wagner's case was that of a woman aged 27, multipara; last confinement, which was followed by normal puerperium of two weeks' duration, preceded the operation by seven weeks. The growth, which was readily movable, about the size of a child's head, was first noticed after her getting up from her confinement. The palpable surface of the tumor seemed more or less smooth, of about the consistency of the liver. Microscopic examination of the blood showed a normal relationship between the reds and whites and the normal quantity. The patient was operated upon Nov. 30, 1893. Recovery uneventful. In April, 1894, her condition was excellent. Vanverts reports her in 1897. which is four years later, as in good condition. The spleen and tumor weighed 1,285 grains, and measured 19x9½x10 cm.

Garre's case, reported by Simon,[4] was that of a woman 38 years of age, iv-para, who since her first confinement

4. Beiträge zur klin. Chir., vol. xxxv, No. 2.

eleven years previously, had suffered some distress in the gastric region. When about five months advanced in last pregnancy she began to suffer much from pains in left hypochondriac region, which, however, subsided in the course of a short time. Normal confinement. In about five months there was a recurrence of the pain in the left hypochondriac region though not severe. The general condition of the patient at this time was that of one being in fair health. Urine normal. Blood: reds 4,310,000, whites, 5,000 per cm. Growth felt in left hypochondriac region. Diagnosed as sarcoma of spleen. Splenectomy; recovery uneventful. Blood count, post-operative; second day, reds 2,350,000, whites 8,600; seventh day, reds 3,600,000, whites 7,800; thirtieth day, reds 4,100,000, whites 7,000; hemoglobin 50 and 60 per cent. Spleen measured 22x13, 5x11 cm., and weighed 1,750 grains. Microscopically growth shown to be a round-celled sarcoma. Reported free from recurrence at the end of four months.

Of the eight cases that survived the immediate effects of the extirpation of the spleen, three cases have died of recurrence (Billroth, Jordan and Kocher), and regarding one (that of Herczel) there exists no data which can be utilized in determining freedom from recurrence. Of the four remaining, two at least may be said to have been free from recurrence, namely, the case of Fritch, living six and one-half years, and Wagner's case, being well at the end of four years. In the remaining two cases, namely, Garre's and the one here reported, it can not be said that a sufficient time has elapsed since the operations to eliminate the possibility of recurrence, yet the fact that the first was, after careful examination at the end of four months and the latter at the end of ten months, found to be possessed of good health, without any discernible evidence of recurrence, entitles one to the belief that freedom from recurrence may be the result. If this be true, primary

sarcoma of the spleen may be looked upon as highly amenable to a cure through splenectomy, for from the foregoing list of cases operated upon, we should, in trying to determine the amenability of the spleen to operative interference in the case of malignant growths, exclude all cases where the same have given rise to metastasis or are under the suspicion of having been secondarily involved. Such would be a contraindication in any organ or tissue of the body. The three cases in which recurrence took place all fall in this class.

It is quite possible that future experience may show that it will be necessary to further take into consideration, when determining the amenability of the sarcomatous spleen to extirpation, the tissues from which the same arise; thus, the spleen offers three types of connective tissue from which it may originate: First, the capsule and trabecula; second, lymphoid structure; and third, the endothelial cells, which give rise, respectively, to the fibrosarcomata, lymphosarcomata and endothelial sarcoma.

A diagnosis at an early stage before the occurrence of metastases is, of course, an essential in the treatment of malignant growths here as elsewhere in the economy.

The early recognition of malignant growths of the spleen presents some real difficulties, on account of the meager symptoms which result from its presence. We could only expect the presence of three symptoms, namely: 1, Enlargement of the spleen; 2, pain; 3, blood changes.

The first symptom, namely, enlargement, must be difficult of recognition in the early stage, owing to the protected position of the spleen making palpation impossible, while percussion is not to be relied upon; owing to the only moderate support which the spleen has through the reflections of the peritoneum, it seems that the increased weight soon lengthens these attachments, with the result that the spleen at an early period acquires a range of mobility, making it possible for it to

descend below the costal margin, where it may become palpable, thus giving us the most trustworthy evidence possible of attainment in the light of our present knowledge of the subject. It having been determined that the growth pertains to the spleen, the nature of the enlargement will present itself for solution. The physical characteristics of the growth will largely aid in this. Thus, if the spleen is uniformly enlarged with its normal shape well maintained it would be a justification for excluding all primary neoplasms at least in the early stage of their formation. While if, on the other hand, the spleen is not uniformly enlarged, but the seat of nodositis or localized enlargement, it would bring up for review those various conditions capable of bringing this about. If it is possible to determine by palpation or aspiration (this latter means of diagnosis is probably not so safe as that of exploration in capable hands) that the enlargement is not cystic, then there is excluded echinococcus and other cysts as well as abscess of the spleen. The growth being a solid one, the question of its being a sarcoma, fibroma, angioma or lymphangioma appears for solution, and this is at times quite impossible until the growth is exposed to inspection by an exploratory incision, although in the instance of Billroth and Garre, it is said that a diagnosis was made prior to operation. Theoretically, we would expect rapid growth, yet a review of the cases does not show this to be always so. This phenomenon has had much stress laid upon it as a symptom, by Ledderhose, Litten, Braun, Kraus and others, but it must often fail in being of real value, owing to the fact that it must be very difficult to determine this in many instances, and if malignancy is suspected, it would seem unwarrantable to defer treatment until the rapidity of growth could be definitely determined.

2. Pain. Considerable pain would be expected to exist, owing to the distension of the splenic capsule, yet

this does not seem to be a symptom of much value, as it is often absent, and if present, a misinterpretation of its significance must often occur, owing to the proximity of this organ to the stomach and left kidney.

3. Blood examination seems to be of no real value from a diagnostic standpoint, as revealed by the results of those undertaken in the cases so far reported.

An analysis of the symptomatology of the primary sarcomas of the spleen leads to the belief that the diagnosis must, for the present at least, be largely based upon the recognition of the existence of a solid growth in the same and that a definite diagnosis can not be made until the spleen is exposed through an exploratory incision, which, it seems to us, would always be indicated where doubts exist.

Treatment. As to treatment no question can exist as to the advisability, in the absence of secondary involvement of other organs, of removing the spleen, which, in the hands of the experienced surgeon, must be associated with but a small mortality, and it is believed that the results of the work so far undertaken are such as to justify the hope that a very large per cent. of primary sarcomas of the spleen will be proven susceptible of a radical cure.

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# VISCERAL COMPLICATIONS RESULTING FROM CONTUSIONS OF THE ABDOMEN.

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WICHITA, KAN.

External violence to the walls of the abdomen is so frequently the source of grave lesions to the intra-abdominal visceræ that I have deemed it worth while to bring the subject before the society with the hope that it may receive a thorough discussion. The importance of this subject is amply illustrated by the great frequency of these accidents, the extreme diversity of the intraperitoneal complications and the extraordinary fineness of judgment required of the surgeon in the presence of a patient who has been prostrated by a blow over the abdomen.

The great difficulty that confronts the surgeon who is called upon to administer to one of these cases is to be able to know whether there is a traumatism affecting one or several of the intraperitoneal visceræ or not.

When we consider that an apparently insignificant blow to the abdomen sometimes provokes a rupture of the intestine or stomach, and that again a very violent blow may be followed by no serious consequences whatever, it is readily seen that there is often exceeding difficulty in formulating an opinion as to the true nature of the case and the course to be pursued in its management.

The urgent necessity for timely intervention indispensable in the successful management of a great number of these cases, renders it obligatory that we arrive

at a correct conclusion in the beginning. If the stomach, liver, spleen or pancreas be lacerated, nothing save immediate operation can be of service to the unfortunate patient.

There are various kinds of violence which, when applied to the external abdomen, are capable of producing serious lesions of the visceræ therein contained: as, for example, the kick of a horse, a fall from a height, the passing of a heavy vehicle across the abdomen, or a blow from a weapon in the hands of an assailant.

In my own experience laceration of the stomach or bowel is more often the result of the kick of a horse than all other agents combined; while the rupture of the liver, spleen, pancreas and urinary viscus are more often produced by the wheel of a loaded vehicle passing across the body of the patient.

From the earliest times man has been so intimately associated with the horse as to render these accidents of extreme frequency, so much so in fact that Kirmisson was induced to gather statistics on the subject; and he states that one person out of every three who has been kicked in the abdomen by this animal must die if left to nature's unaided effort.

The state of the hollow visceræ as regards distension from the presence of gases, aliment or fluid at the time of the accident has much to do with the extent and character of the traumatism inflicted on the hollow visceræ.

The stomach when empty lies deep in the abdomen and high up under the floating ribs, and is, therefore, so well protected that it may escape injury from even a very considerable contusion of the abdomen.

After a heavy meal the condition is different, and the organ may be ruptured by only moderate violence.

The same rule applies with still greater force to the intestinal canal, and consequently a blow on the abdomen when this tube is distended with gas is much more likely to provoke a rent than when the opposite condition prevails.

The urinary viscus and the gall bladder as well are infinitely more vulnerable when in a state of distension than when empty. It is quite likely that the liver and the spleen are more susceptible to traumatism shortly after a meal than when in the less active state between meals. The intestines, the stomach, the urinary viscus, the kidneys, the great vessels and the thoracic duct may each and all be seriously injured by a contusing blow over the abdomen. The bowel, however, is by far the most frequent site of internal complicating lesion arising from contusion of the external abdominal wall.

Of internal lacerations resulting from violence to the walls of the abdomen, 75 per cent. of all are situated in the intestine. The reason for this, as held by many, rests in the fact that the bowel is less well protected in front and is suspended from a bony framework posteriorly in such a way that in case of a blow or kick from in front the bowel when inflated is caught between the yielding anterior abdominal wall and the unyielding posterior framework of bone, resulting in a rhexis more or less extensive. Sometimes when there is not an immediate solution of continuity in the tunicæ of the bowel the damage is sufficient to permit of necrosis and giving way of the structures several days after the injury. This fact serves to explain those cases of peritonitis from extravasation of the contents of the alimentary canal a week, and sometimes longer, after the initial injury. There are very many cases of this kind. The patient may sometimes even go about his accustomed vocation for a day or two after the accident.

The primary lesion of the bowel may consist in an almost invisible rupture or a slit several inches long, or the tube may be rent in twain. The hemorrhage is not often severe when the lesion consists in a simple rupture of the coats of the bowel.

There is much less shock attending a laceration of the intestine than when the stomach is rent. There may be so little shock attending a contusion of the abdomen

with laceration of the bowel that both patient and physician may be deceived as to the gravity of affairs, until beginning peritonitis indicates the true nature of the case. When the violence has been exerted over the epigastrium and the force has been sufficient to rupture the stomach, there is always grave shock, and death may ensue immediately. If the patient survives the immediate effects of the injury and does not receive surgical treatment, peritonitis rapidly supervenes and the case pursues a speedy course toward a lethal termination. The inevitable shock to the solar plexus, the terminal branches of the vagus and sympathetic nerves renders a contusing blow to the upper part of the abdomen of far more serious import than a like injury to the hypogastric region. It is possible for a blow over the full stomach to provoke a rupture of such a nature as to result in fatal hemorrhage, provided one of the larger arteries be involved.

Douglas says that uncomplicated rupture of the stomach is of very rare occurrence, the spleen and the diaphragm generally being involved at the same time. Rupture of the stomach is invariably attended by profound shock. Douglas describes the symptoms as follows: The pain is usually intense and of burning character, the shock is sudden and very marked. Emesis is always present and the vomica generally contains blood. Rigidity of the muscles of the abdomen is generally present and well marked. Rupture of the liver is said to be present in about 17 per cent. of visceral complications as a result of contusions of the abdomen.

As previously intimated, subparietal laceration of the liver is nearly always due to the passing of a heavy vehicle across the abdomen or a fall from a height, the abdomen striking some hard substance. This condition is, therefore, more often encountered among the drivers of express wagons and other like heavy vehicles, carpenters and stone-masons.

The chief indication pointing to an intra-abdominal

laceration of the liver is shock of a persistent and increasing nature, the character of the vulnerating force being taken into account. When the shock is unduly prolonged hemorrhage is to be strongly suspected as the aggravating cause. The hepatic lesion may consist in a slight solution of the continuity of its substance, or amount to complete disseverance of a part of the organ.

Next after the intestines the liver suffers most frequently from violence to the outer abdominal walls. The situation and the anatomical morphology of the liver renders it susceptible to deep contusions as a result of transmitted violence. This character of injury plays an important rôle in the remote manifestations, in a chronologic sense, of the results of intra-abdominal contusions. These remote manifestations referred to consist in the formation of abscesses variously located. The hepatic, the subphrenic, the peritoneal and the perinephric abscess may each be the direct result of a contusion to the outer abdominal parietes. Even where abscesses do not form, adhesions sometimes develop between juxtaposed organs, limiting motion and giving rise to painful manifestations. The gall bladder may be ruptured by means of external violence, as happened in one case by a fall from a horse. When the gall bladder alone is lacerated, the clinical manifestations may be slow to develop. The rapidity with which the case develops depends on the magnitude and location of the rent, and the sterility or non-sterility of the bile.

What has been said of the liver in connection with abdominal contusions may be said with equal propriety of the spleen. Rupture of the spleen is accompanied by great shock. Hemorrhage is profuse and persistent. The spleen, like the liver, may be the seat of contusion, which may give rise to abscess. The pancreas is better protected than either the liver or the spleen, and consequently is less susceptible to traumatism as a result of external violence. Nevertheless, the pancreas is sometimes lacerated and often contused.

Seventy per cent. of ruptures of the pancreas are said to be the result of a heavy weight passing across the body. Shock is profound and hemorrhage is profuse in the case of a lacerated pancreas. The hemorrhage accumulates in the lesser peritoneal cavity and is said to have been mistaken for a cyst of the pancreas. Contusions of the pancreas may end in the formation of an abscess. The kidneys are often injured by external contusions. The lesion to these organs may consist in moderate or extensive laceration, or be limited to a simple contusion. When the kidney is lacerated the urine and blood may be extravasated into the perirenal structures or even into the cavity of the peritoneum.

Orchalgia, frequent urination, hematuria and anuria are significant occurrences when they follow an external traumatism over the region of the kidney.

The occurrence of perinephric abscess is a somewhat frequent sequence of contusions from without. Displacement of the kidney and painful conditions due to the formation of adhesions are among the remote manifestations sometimes referable to an old contusion.

Injuries to the hypogastrium may give rise to rupture of the urinary viscus. This accident is often associated with fracture of the pelvic bones. Douglas says that rupture of the bladder constitutes 8 per cent. of all visceral lacerations resulting from abdominal contusion.

It is quite unnecessary to dwell at length on the treatment of the various visceral lesions resulting from contusions of the abdominal walls, for the surgical proclivity of our era will suggest that to the mind of any member of our profession. The principal difficulty is to be able to arrive at a full comprehension of the case in hand.

In case of rupture of the stomach the death rate, when left to nature, is 100 per cent.; with prompt intervention we know that a certain per cent. recover, so the rule is to operate, regardless of shock.

In case of laceration of the liver prompt operation is the safer procedure, the manner of suture being left to the individual operator.

When the spleen is at all seriously lacerated, splenectomy is safer than to depend on suture. Fevrier collected forty-six splenectomies for laceration of the spleen, with twenty-three recoveries. In rupture of the pancreas the surgeon may be constrained to trust to tamponage for the control of hemorrhage after evacuating the clots from the cavity of the lesser peritoneum.

In kidney lesions much good might be done by timely intervention and the establishment of drainage, and in certain cases nephrectomy might be considered in order to stop hemorrhage.

When the urinary bladder is ruptured there is but one course: immediate intervention.

In the treatment of a ruptured gall bladder drainage should always be ample, even if it has been possible to suture the viscus.

It is in dealing with subparietal lesions of the intestines that we may find it really difficult to know what course to pursue. The indications of laceration of the bowel are not always clear and unequivocal.

If there is no other lesion, it will generally require some length of time, more or less indefinite, for the trustworthy signs of serious intra-peritoneal injury to develop. Persistent rigidity of the abdominal muscles, a gradually accelerating pulse and a rising temperature ought to be taken as sufficient warrant for undelayed intervention.

If the above signs are accompanied by persistent vomiting and either constipation or diarrhea and hiccough, the indications for operation are imperative.

In immediate intervention for bowel lesion a thorough search for the rupture may be made if we find unquestioned proof of such an accident, and the opening may be sutured when found. In delayed operations we should content ourselves with ample drainage.

There are two classes of remote manifestations depending on the effects of intra-abdominal lesions where the small intestines are concerned, that are of especial importance. The first has reference to that class of cases where there is a simple contusion of the walls of the bowel which does not give rise to an immediate leak, but sphacelates after a few days and gives rise to peritonitis.

The other class refers to complications developing weeks or months after the initial injury. The complications referred to consist in the development of abscesses, fistula between neighboring visci, adhesions of diverse nature and which sometimes produce obstruction and give rise to appendicitis.

Hydrops peritonei may sometimes be reckoned among these remote phenomena, and it is not at all improbable that malignant neoplasms may sometimes find their origin in this manner.

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